

## Italian Mathematics between the Two World Wars

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Angelo Guerraggio y Pietro Nastasi. 2005. *Italian Mathematics between the Two World Wars*. Birkhäuser Basel.

An important and effective book, Guerraggio and Nastasi 2005 describes the social and institutional aspects of a limited segment in the history of mathematics. It is important because momentous events occurred in Italy between the World Wars. It is effective because its scope is limited enough that the authors could portray these events in minute and bold detail. Seeing what conditions led to them and how they played out is important to us today and in the future, because the circumstances were not particular to that time and place.

The authors, both originally trained in applied mathematical analysis, have pursued the history of modern Italian mathematics deeply for decades. This book is closely related to their many earlier historical works in Italian—for example, the collections Di Sieno *et al.* 1998 and Guerraggio 1987. The authors support their conclusions with extensive quotations from primary sources: research papers, government documents, and personal correspondence. These are usually presented in the original French or Italian, with English translations of the latter.

For reasons discussed later, readers should read first the preface and the final chapter 9. There are found the authors' statements of philosophy and purpose. First, "mathematics affects society" [page 284]: "We are convinced that mathematical thought is an important force in generating and expediting social and cultural changes". That is a familiar and accepted idea, from the Newtonian synthesis, through the vast developments of the 1800s, to today's deluge of publicity about mathematics and technology. Second, "society affects mathematics" [pages 288–289]:

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Mathematics is [sometimes] thought [...] to be able to go its way, barely annoyed by the trivial changes that the political context imposes on it [...]. [A] previous quotation is clear: mathematics is a real culture and real culture is so strong that it cannot even be grazed by temporary breezes [...]. *We consider this conclusion to be rash and aprioristic.* [Italics by the reviewer].

That is controversial, even within the mathematical research community, where those breezes may be felt as a hurricane. How different the authors' idea is from what the reviewer and many contemporaries absorbed during university studies decades ago, and many younger colleagues since! Even the authors accept the opposite sometimes. They quote favorably [p. 250] an address by Luther P. Eisenhart at the 1936 International Congress of Mathematicians: “[...] mathematics is international. As such it does not recognize national boundaries; these have to do with political and economic considerations”. They failed to note that mathematics requires discourse, and really close international discourse inevitably involves those considerations.

A major goal of the book is to investigate why Italian mathematics declined between the wars, and particularly to study the role of Fascism in that decline. The reviewer suggests that readers use the book to re-search a broader question, *what happened* to mathematics in Italy during that period; then, with the authors, judge how Fascism and other social influences brought about some of those effects. That requires no prior decisions about what constitutes a decline and what Fascism was.

Before leading a tour through the main part of this fascinating study, the reviewer must warn readers that its weakest aspect is the editing. Virtually all of the text seems to have been translated from Italian, without the benefit of copyediting by someone really proficient in English usage. Errors are so dense, particularly in the early chapters, that an alert reader begins to question the book's overall accuracy. When the reviewer pursued questionable passages, he usually found that his concerns stemmed only from mistranslation or incorrect usage. But many — perhaps most — readers will not have English as their first language and may be misled by some errors that are revealed only by English that ‘doesn't sound right’. Those may particularly affect readers who merely dip into the book here and there to gain particular information: they will have no chance to become familiar with patterns of error.

Chapter 1, *Prologue*, sets the scene in which by the onset of World War I Italy had become the country ranking third in mathematics, behind only France and Germany. The authors successfully follow an explicit strategy [p. 284]: “We do not believe in a neat division between history written only for specialists and history devoid of those contents

that absorbed its protagonists". The authors briefly outline the Italian social and political framework and the institutional structure of Italian mathematics, and provide some detail about the Italians' mathematical achievements. They stress the breadth of the mathematicians' interest and involvement [p. 25–27]: "These mathematicians associated their research with their public lives". That research frequently spilled over into related sciences.

"Even more surprising were [their] 'incursions' into fields traditionally occupied by the 'other' culture. [...] [They] developed a strong historical consciousness and also expressed their opinions on philosophical issues. This happened thanks to the presence of a strongly interconnected general culture".

A major component of that culture was the Liberal establishment that had guided Italy's government since Unification in 1861.

The next chapter describes the enormous effect of World War I on Italian society in general, and Italian mathematics in particular. Its eloquent title, *Nothing Is As It Was Before*, raises the question *Why?* Most of the book's readers are probably not familiar enough with Italy's role in the war to answer that question themselves, and the authors, unfortunately, give no references to background information. The reviewer will use Bosworth's 2005 history, *Mussolini's Italy*, to provide a more detailed setting. Guerraggio and Nastasi hint at the country's fervent debate after August 1914 about going to war, and demonstrate that most Italian 'mathematicians' favored intervention on the Allied side. Bosworth notes, however, that most Italians favored neutrality. Although conservative elements in the establishment brought Italy, terribly underprepared both militarily and economically, into the war against Austria in 1915 and against Germany in 1916, it was not presented "as a popular and involving event, a crisis in which the whole nation must fuse to defeat the enemy," until 1917 [Bosworth 2005, 58–59, 61, 81]. Guerraggio and Nastasi illustrate how some individual mathematicians participated, but note that military-operations research, which would become a major preoccupation during World War II, was only in its infancy. What happened in 1917? No longer engaged against Russia, Austria dealt Italy a crushing defeat at Caporetto, near its current border with Slovenia. Military disaster and the growing economic crisis brought the Liberal establishment widespread discredit. According to Bosworth, "At that moment, Italy seemed very likely to follow Russia out of the war and into domestic revolution". That did not occur, but economic ruin persisted, and [Bosworth 2005, 64, 92]

The post-war period was soon to see the rise of a medley of bourgeois, intellectuals, and returned soldiers, who were ready to gamble the lives and well-being of their fellow citizens to convert [...] a 'maimed vic-

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tory' [...] into a real (and Fascist) one [...]. Men who had once automatically viewed themselves as liberals now took to infringing the rule of law [...] and to seeing the armed society of the totalized First World War as the ideal political and economic model for peacetime, too [...]. [The] first casualty would be the gentler, kinder, more studied and restrained world of the Liberal *belle époque*.

The Fascist party and Benito Mussolini took over the Italian government in 1922. Guerraggio and Nastasi note [p. 57, 94], “The end of the war made the resumption of normal life possible, but in a disenchanting atmosphere [...]. Fascism got off with very quick steps to claim the primacy of politics over any other aspect of individual and collective life”. Guerraggio and Nastasi chronicle in exquisite and sometimes painful detail how Italian mathematicians participated in this transformation or were eventually excluded from Italian mathematics.

Chapters 3–6 are devoted to the 1920s. Guerraggio and Nastasi present a fascinating survey of Italian research in pure and applied analysis, probability theory, and mathematical economics. Their discussion of algebraic geometry—which they term the *queen* of Italian mathematics—and of its king and crown prince, Federigo Enriques and Francesco Severi, is interesting and informative, but parts are unintelligible to readers who are not specialists in that area. The authors also trace the relations between Italian and German mathematicians, once very close, but severely strained since 1914. Throughout these chapters, the authors stress the leadership of Guido Castelnuovo, Enriques, Tullio Levi-Civita, Mauro Picone, Salvatore Pincherle, Severi, Leonida Tonelli, and Vito Volterra, and the contributions of a few of their followers. The nationally and internationally acknowledged leader of Italian mathematics at the beginning of that decade was Volterra, vice president then president of the National Academy (*Accademia dei Lincei*), and chairman of the National Research Council.

Chapter 4 describes the direct influence of Fascism on Italian mathematics, particularly through the far-reaching structural reforms of the school and university systems devised by the Minister of Education, Giovanni Gentile. The authors reveal intimate details of the personal interactions involved. The stories are extremely interesting and troubling. Before the war, Gentile and another philosopher/journalist, Benedetto Croce, had severely attacked Enriques’s expositions of the modern abstract approach in mathematics. In 1925 Gentile garnered the support of a number of intellectuals for a manifesto supporting the totality of the fascist reforms, but attracted only one leading mathematician, Pincherle. By that time Croce had split with the regime, and secured backing by Volterra and most other mathematicians for a counter-

manifesto supporting traditional scientific detachment. The Fascist regime was then evolving a new policy toward the cultural world [p. 289]: “great sensitivity and [...] attention towards the role that intellectuals can play. Their approval can be won [...] with the ‘stick’ or the ‘carrot’”. Gentile prevailed in this war of manifestos and Volterra was forced out of his official leadership roles by 1926. The carrot attracted Severi, his successor as leader. Enriques’s protégé in algebraic geometry in the early 1900s, Severi had been Enriques’s fierce challenger since at least 1921. Severi enthusiastically espoused Fascism, and Gentile installed him as the only mathematician in the Academy of Italy, a new organization intended to supplant the National Academy. The authors quote detailed and fascinating correspondence and government documents about Severi’s ascendancy. The story of the 1920s culminates in section 6.5, on the notorious loyalty oath that the regime required all professors to sign in 1931. The authors detail the genesis of the oath and its exact wording. Volterra was one of only twelve to refuse—the only mathematician. He was immediately dismissed from his university position and all Italian scientific societies.

Chapters 6–8 continue this story through the 1930s. Algebraic geometry remains an inscrutable queen, but the account of developments in analysis is intriguing and enlightening, particularly that of applied work spurred by the Fascist regime’s insistence on social relevance. These chapters chronicle the gradual deterioration of Italy’s international presence in mathematics. The crash comes in section 8.3 with the terrible 1938 racial laws, by which Italian Jews lost virtually all means of livelihood. In particular, the renowned leaders Castelnuovo, Enriques, and Levi-Civita were fired. (Pincherle had died in 1936). The authors describe not only these direct effects, but how the mathematics faculties explicitly rationalized imposition of the laws, and attempted to rewrite history to expunge the records of the Jews’ research and leadership. Thus Guerraggio and Nastasi have traced Italian mathematicians’ progress from disillusion in 1918, through Fascist transformation, to disaster in 1938 [p. 288]:

From this group of researchers and professors —Fascist or [uncommitted], always and above all mathematicians— come folkloristic tributes to [Mussolini, the Leader], to his innumerable and irresistible talents and to the achievements of Fascism, trumpeted in the prologues to books and speeches. Mathematicians soon conform to the repetitive rhetoric of the Fascist style, adjusting to the rhetorical code exhibited in the public-ceremonial sphere. What can be inferred if not a loss of reason, ridiculous and actually unaccountable?

Fascism deprived Italian mathematics of the work of some of its major contributors. It sidetracked much of the effort of mathematicians into fruitless political posturing and thrashing. Those responses in turn brought about a major loss in credibility. After the Fascist period, much effort was required to reestablish Italy's position in mathematical research.

Major determinants of a book's value include whether it imparts new and vital information and whether it should excite readers to further study. Guerraggio and Nastasi 2005 succeeds both ways. The reviewer was rapt by its detailed accounts of events about which he'd read only rumors, and mathematics he knew by name only. He was immediately stimulated to acquire more historical background. The book implicitly suggests inquiries that could become engaging projects. For example, deeper studies of the Italian mathematicians' work in neighboring disciplines and in public dissemination of mathematical ideas would be fascinating. For some of these mathematicians very interesting biographies are available; for the others, biographies are clearly needed.

This review closes with some comments about production matters, addressed to editors and publishers as well as readers. In short, Guerraggio and Nastasi 2005 received insufficient and careless editorial attention. As an initial example, on the copyright page the description of the cover is wrong. There is a good name index, but no subject index. Also making the reader's job harder is the lack of a bibliography. Most primary sources are adequately cited in footnotes, but readers must find them by re-reading in order to follow them. Almost no secondary sources are cited to lead the reader to background information. On the other hand, the book's inclusion of original Italian texts or translated quotations is laudable—even essential, since many of the translations are inadequate and possibly misleading. Since the body text was probably translated from Italian, the following comments about language errors apply to virtually the entire book.

English possessives are often used inappropriately. For example, *Caporetto's retreat* [p. 57] suggests an action by an officer named Caporetto, not a catastrophe at a place called Caporetto. Present tense is often used where past is appropriate: that makes it difficult to distinguish the authors' descriptions of past events from their expressions of opinion. For example, taken out of context the quoted paragraph in the third paragraph before this can be interpreted either way. There are many spelling errors that software should have identified. Here are some typical diction and translation faults that could seriously affect readers' understanding.

- Lipsia, Monaco, Sorbona, Zurigo = Leipzig, München, Sorbonne, Zürich.
- Frequently, ‘conference’ should be ‘lecture’, and physician should be ‘physicist’.
- ‘Coherence’ of non-Euclidean geometry should probably be *consistency* [p. 8].
- ‘Genial’ intuitions should probably be ‘ingenious’ [p. 13].
- Compressed gas ‘recipients’ should probably be ‘receptacles’ [p. 45].
- Students killed or blessed were probably killed or wounded [p. 57].
- A minority of ‘factoids’ is probably one of ‘factious people’ [p. 59].
- Instead of the admiring tone of ‘Crafty people who enrich [...] themselves’, the more negative *Cunning* ‘people’ was probably intended [p. 59].
- ‘Intransigent’ must be misused: the first paragraph on page 72 is unintelligible.
- The ‘eventually infinite’ combination should probably be ‘perhaps infinite’ [p. 77].
- ‘Ophelimity’ and ‘deicidic’ are not in most dictionaries [pages 121, 259].
- Innermost ‘bounds’ should be innermost ‘connections’ [p. 121].
- Most readers think a ‘tern’ is a type of bird, not a lottery [p. 195].
- Italians ‘ennobled’ for the Oslo congress probably ‘embarked’ for it [p. 248].
- ‘Compagna di Gesù’ = Jesuits [p. 260].
- ‘Journal’ of Italian mathematical production should be ‘review’ [p. 267].
- Extraordinary mathematical ‘liking’ should be ‘taste’ [p. 280].

Chapter 3 is particularly ridden with such errors. For instance, on page 76 in the bottom paragraph the second sentence about Giuseppe Vitali and Henri Lebesgue is unintelligible. Moreover, that chapter lacks many citations of sources: for example, none is given to enable readers to determine what Lebesgue actually wrote or said.

### References

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- EISENHART, Luther Pfahler. [1937] 1967. Discours. In International Congress of Mathematicians [1937] 1967, 53–54. [Guerraggio and Nastasi misidentify Eisenhart on page 250].
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