

1. I've posted an initial list of [suggestions for term paper topics](#). I'm *not* suggesting that students should select from this list. I'm merely recording some of my bright ideas, to give you an idea of what might be possible.
2. Struik's prefaces and introduction: discussion.
  - a. Struik discussed the *limitations* of his book:
    - i. Insufficient references to the cultures that fostered or inhibited development of mathematics.
      - (1) But the mere presence of such references was a distinguishing feature of this text!
      - (2) I hope to contribute some, and maybe students can add some.
    - ii. The book ends at 1945.
      - (1) More pages of mathematical research have been published since 1945 than in all previous years.
      - (2) I'll contribute a little post-1945 material to continue a few stories to the present.
  - b. Struik's *advice*: check references and original sources.
    - i. I'll spend some time explaining what this means, how to do it, etc.
    - ii. And I'll provide quite a few examples.
  - c. Struik stated some of his underlying *principles*:
    - i. Emphasize the continuity and affinity of Oriental (what does that mean?) origins.
    - ii. Emphasize the distinctions between historical fact, hypothesis, and tradition.
    - iii. Relate the algebraic-arithmetic and "*fluxional*" trends in Renaissance mathematics. The latter term means "related to calculus."
    - iv. Base the history of the 1800s on people rather than on subjects.
      - (1) That created a problem for investigating the history of a subject.
      - (2) I'm more familiar with 1850–1950 than any other period.
  - d. Also, consider these questions:
    - i. Who was Dirk Struik? (A good report or perhaps a paper topic.)
    - ii. Who is the book's audience? You? Me? All mathematics teachers?
  - e. Some of Struik's terms:
    - i. English terms
      - (1) differential equations
      - (2) *function theory* (here = complex analysis)
      - (3) *fluxional*
      - (4) hydrodynamics
      - (5) Oriental (here includes North African and Middle Eastern)
      - (6) Renaissance
      - (7) transliteration (for example, Чебышёв = Čebyšev = Chebyshev = Tschebyschew)

- ii. I don't know much about
  - (1) Cartesianism
  - (2) Kantianism
  - (3) Scholasticism
- iii. French term: *abrégé* = to abridge
- iv. German terms:
  - (1) *allgemein* = general
  - (2) *Altertum* = antiquity
  - (3) *Auffassung* = conceptualization
  - (4) *bedeutend* = important
  - (5) *Beziehung* = relationship
  - (6) *endlich* = finite
  - (7) *Entwicklung* = development
  - (8) *Gegenwart* = the present
  - (9) *gelöst* = solved
  - (10) *Geschichte* = history
  - (11) *gross* = great
  - (12) *höher* = higher
  - (13) *Jahrhundert* = century (*Jahr* = year)
  - (14) *Mathematiker* = mathematician
  - (15) *Mittelalter* = Middle Ages
  - (16) *Quelle* = source (as a well)
  - (17) *Reihe* = row or series
  - (18) *Skizze* = sketch
  - (19) *Stück* = piece
  - (20) *Technik* = technology
  - (21) *Verbreitung* = spread (*Breite* = breadth)
  - (22) *Vorlesung* = lecture (*vor* = before, *lesen* = to read)
  - (23) *Wissen* = knowledge or wisdom
  - (24) *Wissenschaft* = science
  - (25) *Wort* = word
  - (26) *Zeit* = time
- v. Italian terms:
  - (1) *attraverso* = through
  - (2) *come* = as
  - (3) *descrittivo* = descriptive
  - (4) *giorno* = day
  - (5) *nostro* = our
  - (6) *passato* = past
  - (7) *piano* = plane
  - (8) *sino ai* = up to
  - (9) *storia* = history
- vi. Latin term: *bibliotheca* = library

- vii. You should get used to recognizing cognate words to make rough translations. That activity plays a major role in Peano's story.
- f. Otto Neugebauer was both a historian of ancient mathematics and the founder of *Mathematical Reviews* in 1940 and its German predecessor in 1930.
- 3. *Mathematical Reviews*, once a hardcopy review journal, is now called *MathSciNet*. It is available on the Internet in entirety, through our library. A service of the American Mathematical Society, this resource is absolutely essential for investigating the mathematical literature since 1940. In our bibliography I generally note when an item has been reviewed there, and give the name of the reviewer. You should acquire the habit of reading reviews.
- 4. Kennedy, chapter 1
  - a. *What country?* Peano was born in 1858 in the Kingdom of Sardinia. That consisted of the island of Sardinia plus the current Italian region of Piedmont. 
  - b. Map:  
<http://www.italy-weather-and-maps.com/italy/maps/piedmontmap.php>  
"Piedmont" means "foot of the mountain" (the Alps).
  - c. The capital was Turin; the principal language was Piedmontese, an Italian dialect. The Savoy family ruled via a constitutional monarchy. Piedmont led the *Risorgimento* movement toward Italian unification. In 1860 it absorbed the neighboring coastal and Tuscan regions, the Austrian provinces in the northeast, and the Bourbon kingdom in the south, becoming the Kingdom of Italy. The Papal States in the middle joined only in 1870. (The Papacy didn't recognize the Kingdom until about 1925!).
  - d. Peano's family owned and worked a farm in the countryside near Cuneo. Warning: the pictures referred to next are large files!
    - i. [Click here](#) for a picture taken near there in October 2008.
    - ii. [Click here](#) for one of his house, from Kennedy, page 3.
  - e. He was schooled at a nearby school for a while, then in the city of Cuneo.
    - i. [Click here](#) for a picture of some Cuneo government buildings that were probably there in his time. The group is heading toward a market street just visible at the far right.
    - ii. [Click here](#) for a "historical" cheese vendor at the Saturday market.
    - iii. [Click here](#) for a vendor of *castagne*. What are those? Think of a Spanish cognate word!
  - f. I took those pictures while participating in the October 2008 congress, *Giuseppe Peano and his School between Mathematics, Logic, and Interlingua*, held in Turin and Cuneo.
    - i. [Click here](#) for a picture of the conference organizers, mathematics historians Clara Silvia Roero and Erika Luciano, about to have lunch at a restaurant near that market.
    - ii. The congress event at Cuneo consisted of our tour of a museum display of Peano memorabilia, and a pair of lectures on Peano's life and influ-

ence, presented to us and about two hundred Cuneo school children, ages about ten to sixteen. They were marvelously attentive!

- iii. I circulated in class the document Luciano et al. 2008, published by the City of Cuneo to celebrate the event.
- g. Evidently Kennedy didn't research Peano's schooling. Here is an excerpt from section 1.1 of Marchisotto and Smith 2007 about Mario Pieri (1860–1913), who would become Peano's colleague:

During Mario Pieri's time, schooling was compulsory only from ages six to nine, and was not well enforced. As a result, among industrializing countries, Italy's rate of literacy was lowest: 68% in the north, 30% in the south. There was a single elementary-school system, serving ages six through twelve. About 30% of elementary teachers were priests. There were two tracks of middle schools. The classical track consisted of lower- secondary *ginnasio* and upper-secondary *liceo* — five plus three years. The utilitarian track consisted of four years in *technical school*, followed by three years in *normal school* or four in a *technical institute*. Normal schools trained elementary teachers. A student in the last two years of a technical institute would select a curriculum in accounting, agriculture, commerce, industry, or physics-mathematics. The *liceo* provided full access to university; the technical-school physics-mathematics curriculum, access to university science faculties. Only rarely were graduates of other curricula allowed to attend university. Most Italian mathematicians of Mario Pieri's time received their middle-schooling at technical institutes, not *licei*. . . .<sup>1</sup>

- h. What mathematics was taught? I'm not really sure. Let's speculate, because next we'll turn to its history. Most of us learned arithmetic, algebra, geometry, and trigonometry in school; we suppose the same was true of Peano. I know that his first year of university studies included calculus. I suppose, but don't know, that he had not studied calculus in school. Someone suggested logic —Peano probably studied Aristotelian logic and Pascal's thoughts about the axiomatic method. He would *not* have studied logic in the modern sense: he was one of its inventors!
5. *Assignment*
- a. Read Struik, chapter 1.
  - b. In recent years, the study of the mathematics of preliterate and very ancient literate societies has become a substantial research area, called *ethno-mathematics*. It belongs to both mathematics and anthropology. Struik was not concerned very much with this field, and I have very little knowledge of it. This course won't spend much time on it.

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<sup>1</sup> Barbagli [1974] 1982, 13, 48–70, 329–330: literacy statistics for 1901, teacher statistics for 1868. Curricula at technical institutes had been lengthened from three to four years in 1871. The *ginnasio* and *liceo* were together similar to the German *Gymnasium*, while the technical school and institute were analogous to the *Realschule*.