

Some impressive points on the Italian tradition of math education from Chinese culture perspective

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My outline

1. Italian **deduction** reasoning

2. Italian mathematical

Laboratory

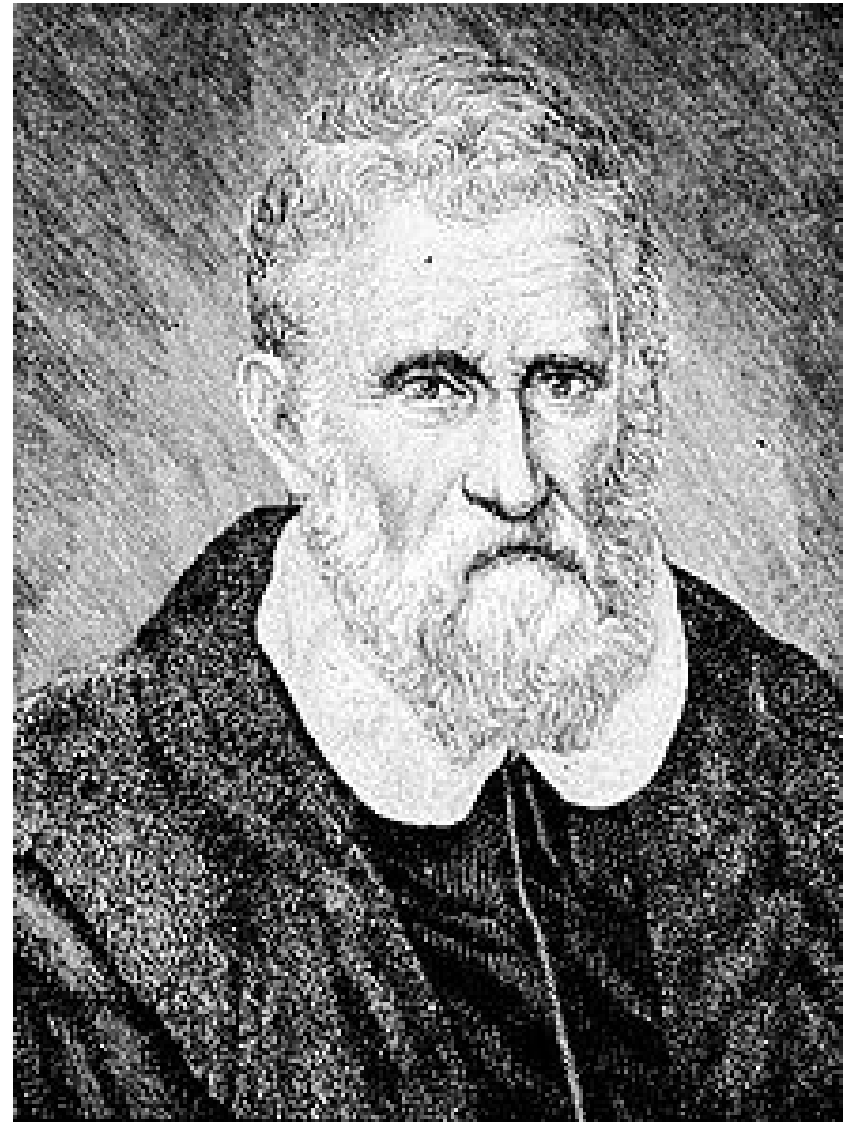
3. Italian **perspective** geometry

Historical aspects of Italian mathematics and mathematics education:

- Historical contributions to mathematics between China and Italy.

Marco Polo (马可波罗)
visited China

- AD. 1254—1324
- Took 3 years to travel
- Direction sense
- Rich Geometry Knowledge



Matteo Ricci and Guangqi Xu

- Euclid elements firstly translated into Chinese
- Chinese could learn geometry
- The Italian Jesuit **Matteo Ricci** (left) and the Chinese mathematician Xu Guangqi 徐光启 (right) in 1667.
- Xu Guangqi prime minister



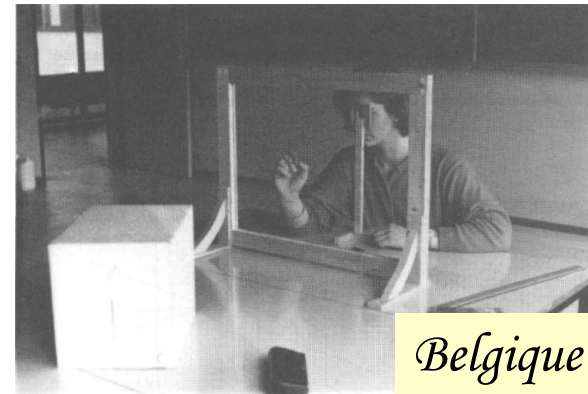
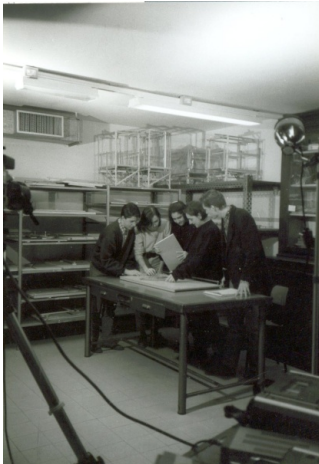
The Chinese edition of Euclid's Elements (幾何原本), was printed in 1607.



Deductive reasoning enter
Chinese schooling system in
17th century

Italian mathematical Machine

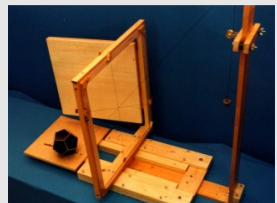




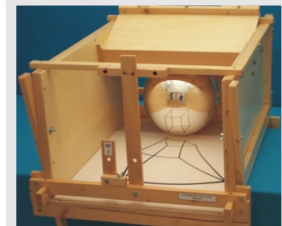
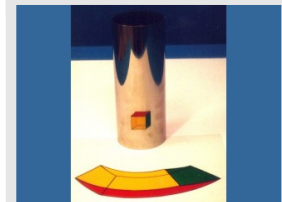
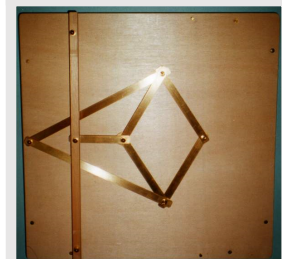
Belgique



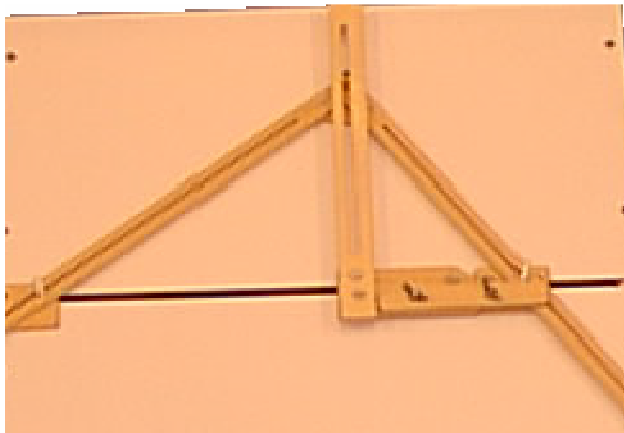
Italy



More than 200
mathematical instruments
drawing on historical sources
from classical age
(Euclid, Archimedes,
Erathostenes, Apollonius,
Nichomedes)
16th century (e. g. Durer)
17th century
(e.g. Descartes, Desargues)
18th century (e. g. Newton)
and so on.



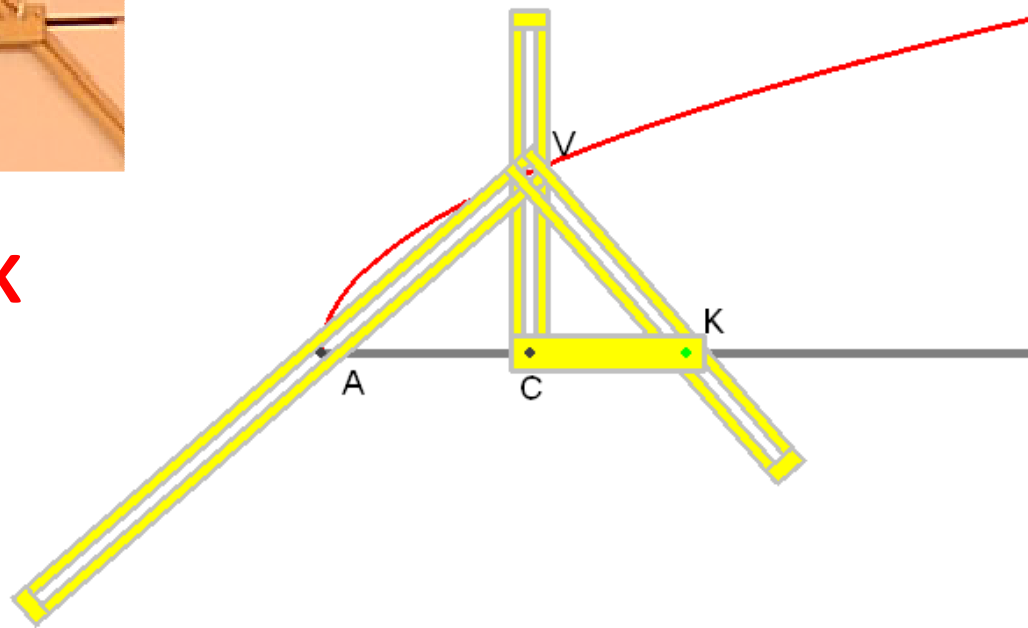
Bonaventura Cavalieri (1632)



$$AC : CV = CV : CK$$

$$x : y = y : 2p$$

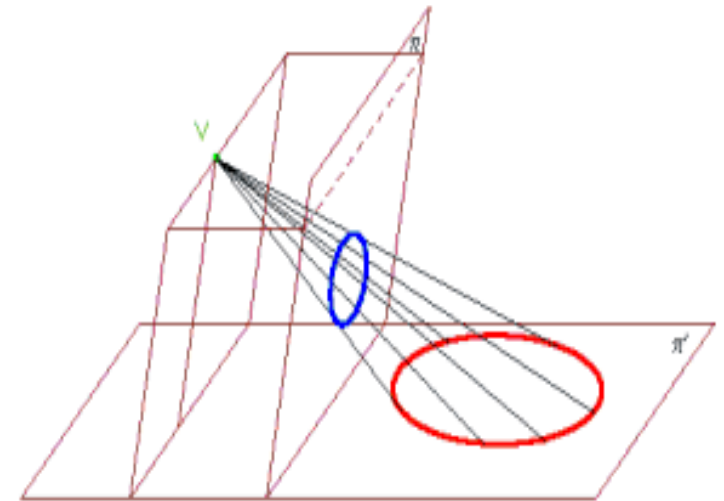
$$y^2 = 2px$$



conic section learning : doing & imaging



http://www.museo.unimo.it/theatrum/macchine/_00lab.htm



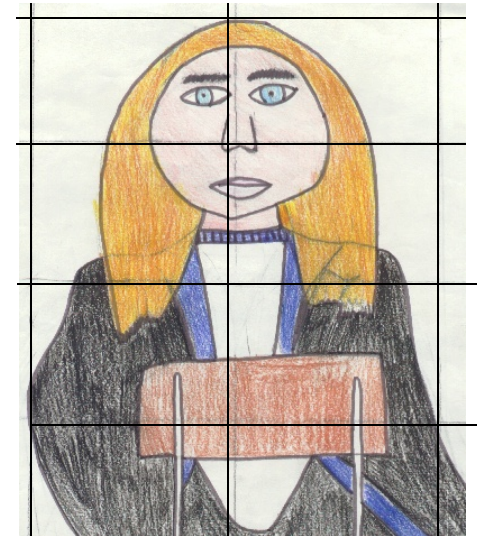
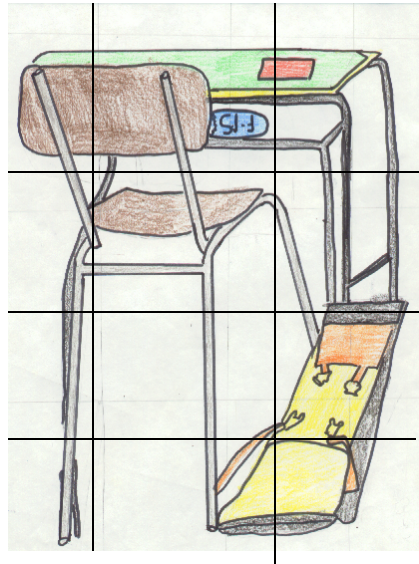
Perspective geometry in italian tradition

Chinese drawing and Italian drawing

- 2 D drawing VS 3D drawing.
- No perspective drawing lesson in Primary school in China

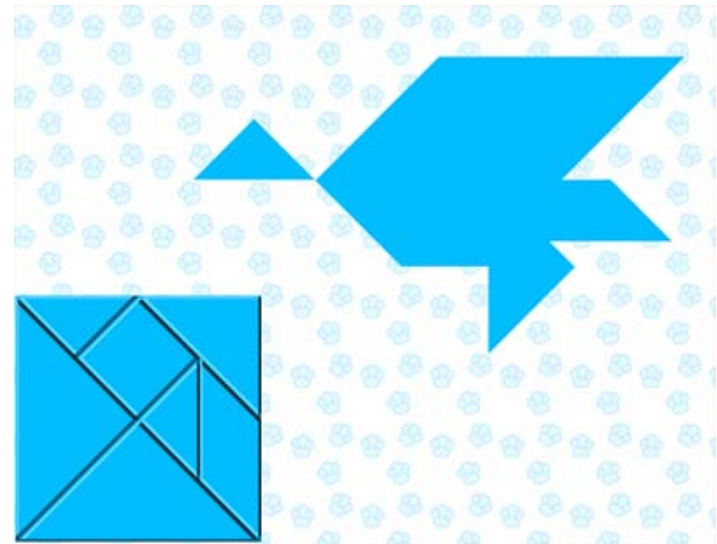


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Another teaching experiment:
3rd graders drawings
by means of Dürer's grid

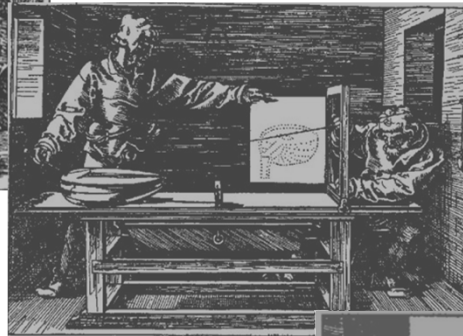
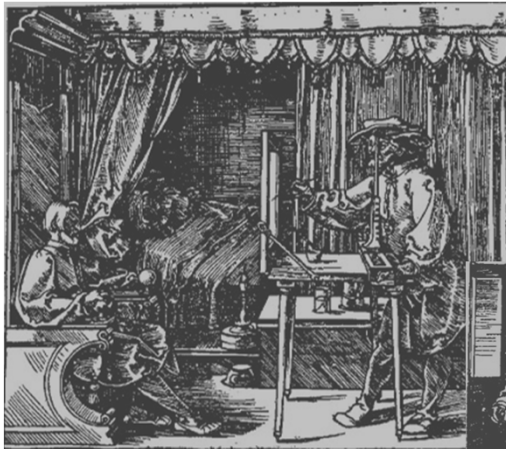


Mathematical aspects of Italian mathematics education

- Ferdinando asked school teacher how develop reasoning in teaching during visiting school during ICMI STUDY 23.
- Chinese teacher mentioned traditional 七巧板
The **tangram** (Chinese: 七巧板 ; "seven boards of skill") cutting paper



Perspective drawing in Italian history



Mathematical Laboratory

A mathematics laboratory activity involves people, structures, ideas, as well as a Renaissance workshop, in which the apprentices learn by doing, seeing, imitating and communicating with each other, namely practicing. In the activities, the construction of meanings is strictly bound, on one hand, to the use of tools, and on the other, to the interactions between people working together.

*(**Matematica 2003**, curricula, prepared by the UMI-CIIM on behalf of **the Italian Ministry of Education**)*

Perspective drawing (primary school)

Some images from a teaching experiment carried out in primary school with the use of an instrument about perspective

Working with device In italian tradition

1. **Exploring** the material artefact (how it is made? Geometrical structure and so on)
2. **Using** the artefact for a task (e.g. to draw a curve)
3. **Proving** why the artefact is able to draw this curve.
4. **Investigating** further questions: what could happen if some lengths are changed and so on? How is it possible to produce different conics with small changes?

Institutional aspects of schooling: Italian cultural background contrast with Chinese one

1. All class time in China is strict 45 minutes vs flexible class time.
2. Special education school vs combined normal class together
3. Student listen vs speak
4. Limitation vs Freedom

Italian tradition

1. Italian **deduction** reasoning

2. Italian mathematical

Laboratory

3. Italian **perspective** geometry

- Mathematics in Italian tradition
- Geometry VS 数学 number study

Number image difference

- Italian Number line vs Chinese abstract number

$$3 + 1 = 4$$

