French Translations of Euclid's Elements in the first half of the 17th century
A Study of a Book in the Education Sphere

Mia Joskowicz, Tel Aviv University

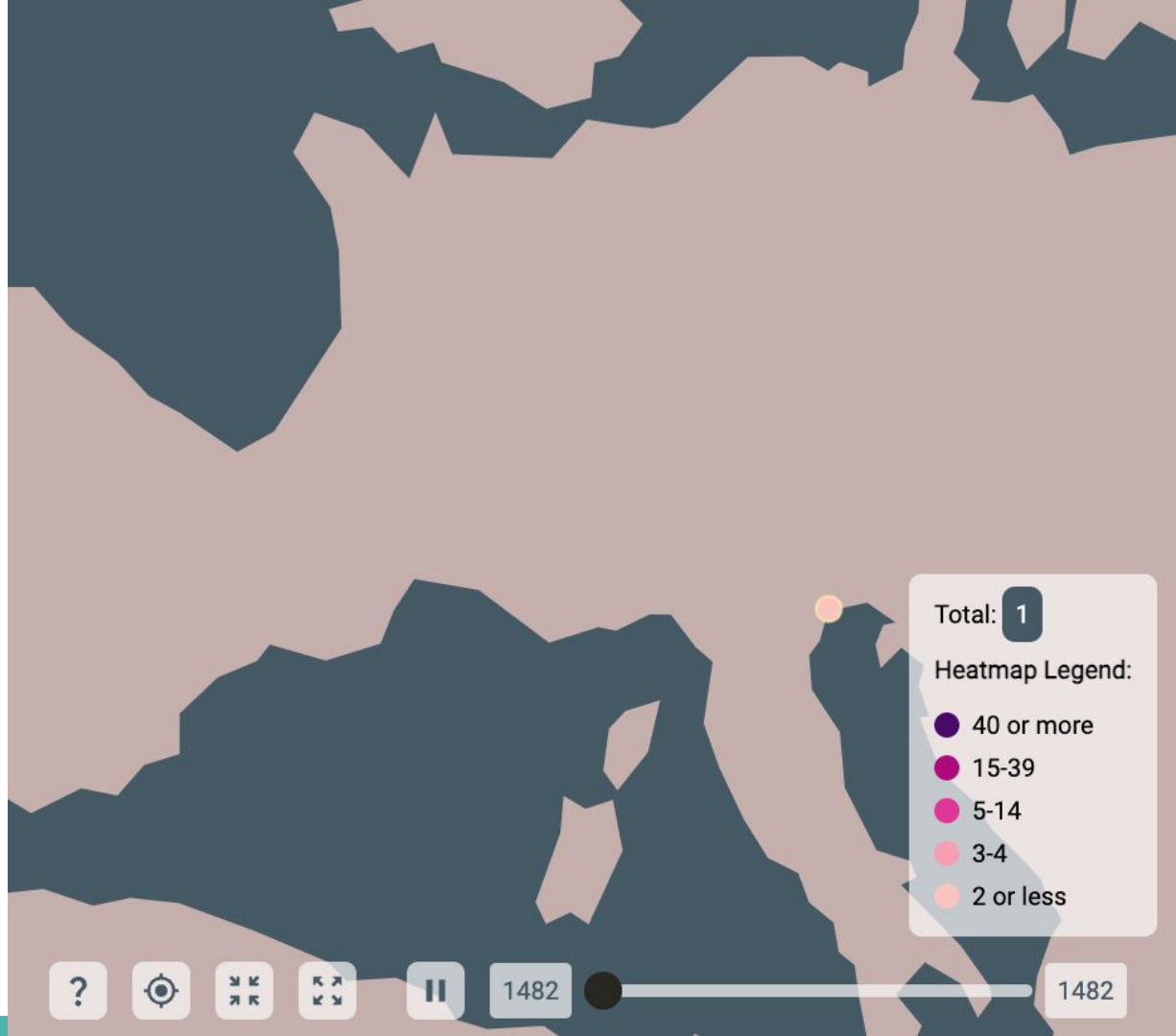
Slides!

Presentation Roadmap

☞ Goal: Present my research to spark discussion.

- ➔ Motivation
  - ◆ Why are early 17th-century French translations of the Elements such a compelling case?
  - ◆ Why is an educational lens a valuable perspective?
- ➔ Guiding questions and provisional assumptions.
- ➔ What can applying an educational perspective entail?
  - ◆ Sub-questions
  - ◆ Methodological teasers and illustrative examples.
  - ◆ Connections to broader scholarly trends.
- ➔ Summary

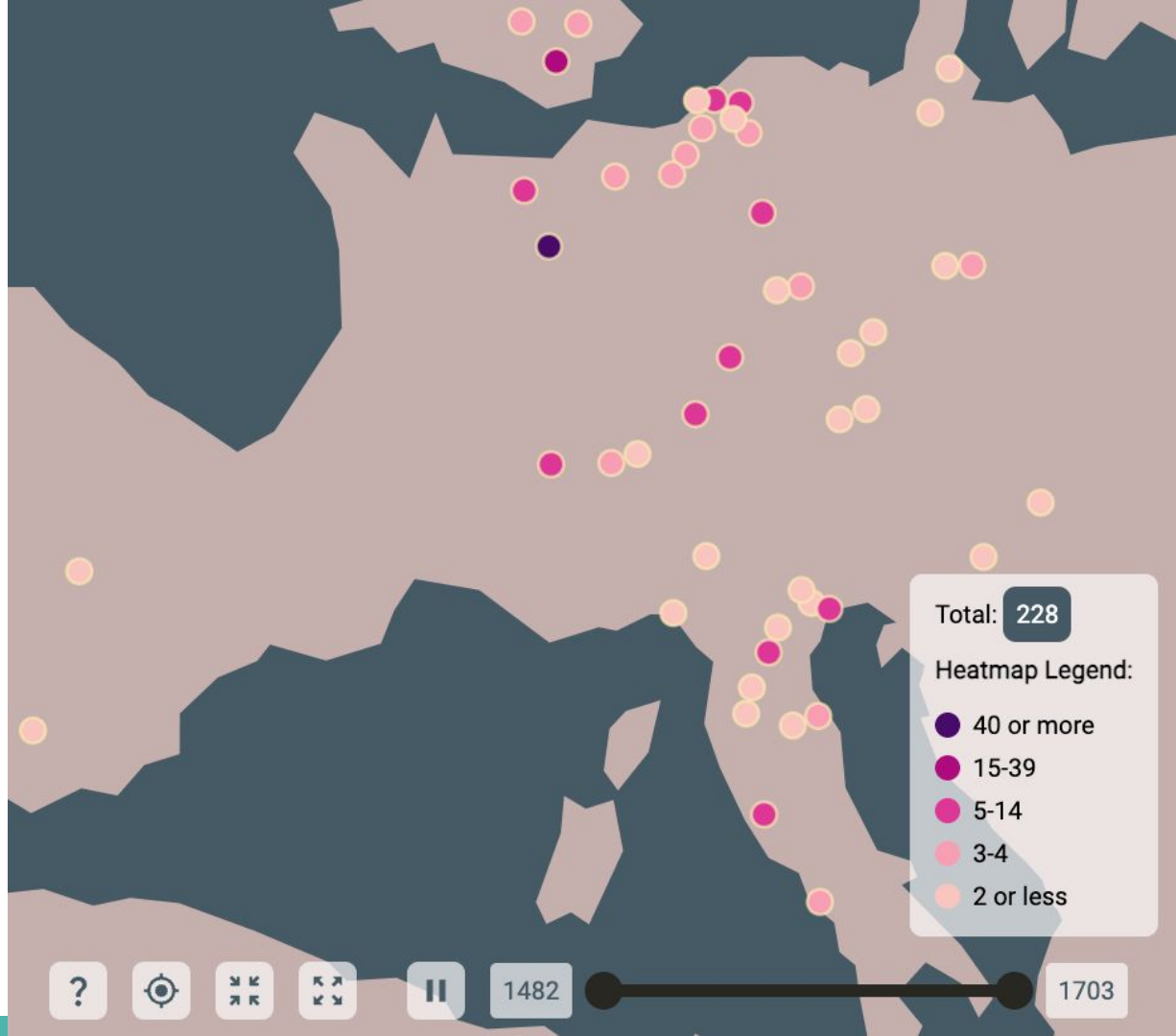
A Proliferation of Editions



** Based on Wardhaugh's 2020 catalog with adjustments.*

*** Classification of translation vs. adaptation and additional editions not currently identified may affect map accuracy.*

A Proliferation of Editions



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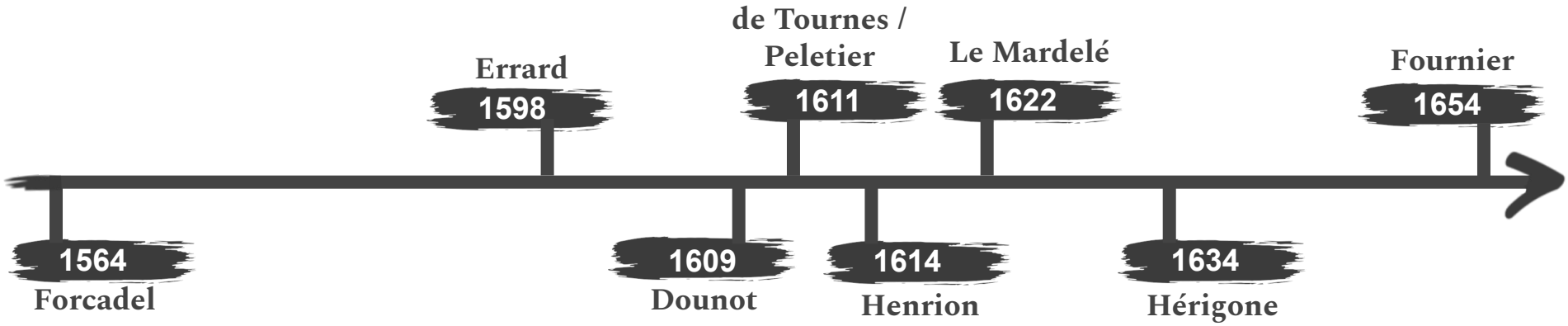
Printed French *Translations* of Euclid's Elements



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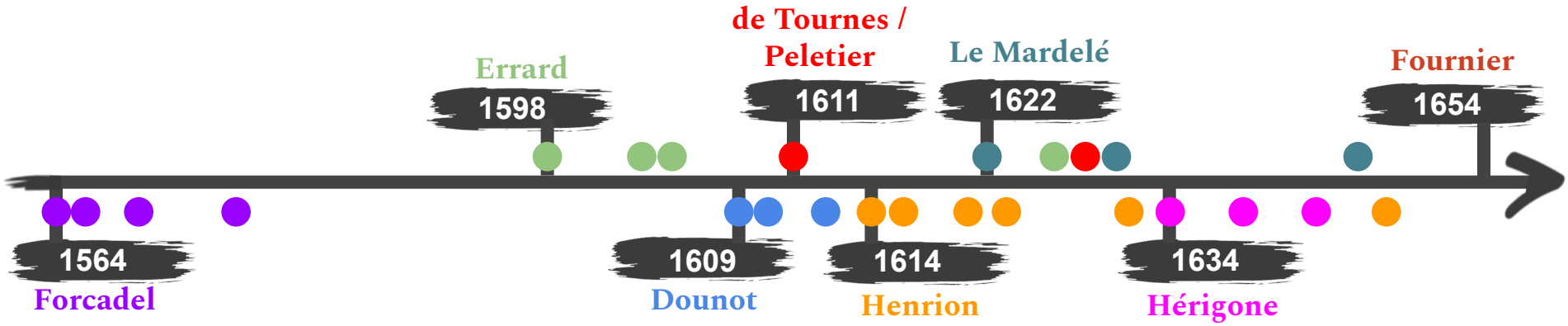
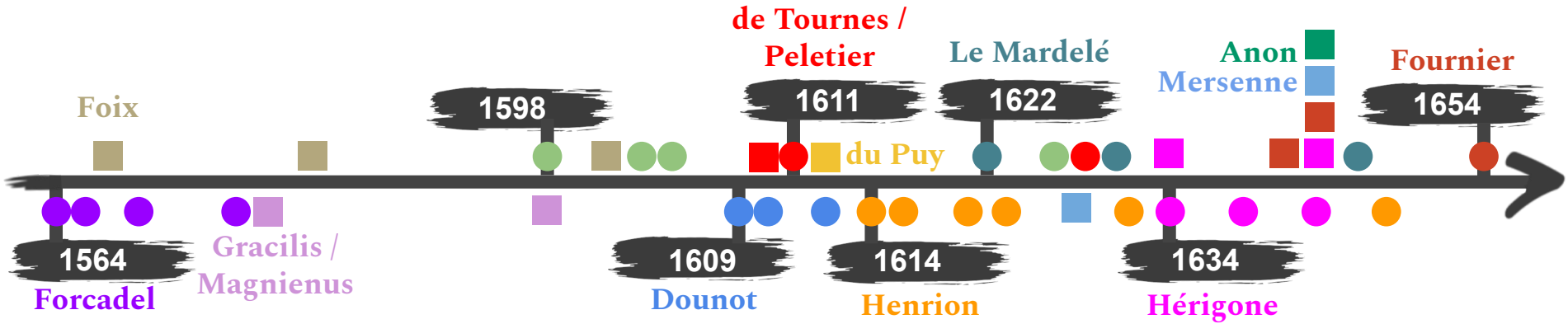
Printed French *Editions* of Euclid's Elements



Printed French and *Some Related Latin* Editions of Euclid's Elements



☞ Numerous Editions in a Short Timeframe and a Restricted Geographic Area.

Zoom In: A Single Proposition

☞ The translations diverge noticeably.

1564
Forcadel

PROPOSITION V.

Si vne ligne droicte eſt diuiſee en deux pieces egales, & en deux inegales, le rectangle contenu des pieces inegales de la toute, auec le quarré de la ſection entre moyenne, eſt egal au quarré de la moitié.

SOit la ligne droicte HB couppée egalement en C, & inegalement en N. ſoit fait le rectangle des pieces inegales HN, NB: (c'eſt à dire, le rectangle HI.) Soit auſſi fait le quarré de la moitié CB (c'eſt à dire, le quarré GF) & ſoient tirées NIG, & LIM D'autant que BM eſt egale à NI, & MF egale à CN (c'eſt à dire, à LI ou IG) il enſuit que LG eſt vn quarré, lequel joint au rectangle HI, ſont enſemble egaux au quarré CF, parce que le rectangle NF eſt egal au rectangle HL, eſtant compris de lignes egales par la conſtruction.

1634
Hérigone

THEOR. V. PROPOS. V.

Si vne ligne droicte eſt couppée en deux parties égales, & en deux parties inégales, le rectangle contenu des parties inégales de la toute, auec le quarré de la ſection du milieu, eſt égal au quarré de la moitié de la toute.

Hypoth.
ab *eſt* —,
ac 2|2 cb,
ad 3|2 db.

Req. à demonſtr.
□.adb + □.cd 2|2 □.cb.

Preparation.
46. 1. | cf *eſt* □. cb,
1. p. 1. | eb *eſt diametre*,
31. 1 | dg = bf ü ce,
31. 1 | al = ce,
31. 1 | lhi = ab.

Demonſtr.
1. c. 4. 2 | kg & di *ſnt* □,
2. ſ. 29. 1 | aK, ci, df *ſont* □;
hyp. | ac 2|2 cb,
36. 1 | □ak 2|2 □ci,
c. 43. 1 nota | □df 2|2 □ci,
1. a. 1 | □df 2|2 □ak,
□eh *commun add.*
2. a. 1 | *gnom.* kbg 2|2 □ah ou
19. a. 1 | □cf 2|2 { *gnom.* kbg + □kg,
concl. | □cf 2|2 { □ah, + kg□.cd.

G. iij

Fournier
1654

Si vne ligne droicte eſt coupée en deux parties égales, & en deux parties inegales, le rectangle contenu des parties inegales de la toute, auec le quarré de la partie du milieu, eſt égal au quarré de la moitié de la toute.

La ligne droicte AB, ſoit diuiſée au poinct C, en 2. parties égales, & en 2. parties inegales au poinct D. Ie dis que le rectangle contenu ſous AD, & DB, parties inegales de la toute AB; auec le quarré de la partie du milieu CD, eſt égal au quarré de CB, moitié de la toute AB.

Car ſoit deſcrit CF, quarré de CB, & ſoit mené le diametre BE, & par le poinct D, ſoit menée DG, parallele à BF, ou CE, coupant le diametre au poinct H, & par le poinct H, ſoit menée IK, parallele à AB, & du poinct A, menée AL. o 46. 1. p 31. 1.

Why? Read in Context!

The proliferation of editions along with the variations they display in multiple dimensions

What does each translation contribute that is absent from other French versions and from the larger body of mathematical texts at the time? What gaps, or lacunae, do these translations address?

These gaps may not be purely **mathematical**; they could be **social**, **political**, **religious**, **cultural**, **cognitive**, **philosophical**, **etc**.

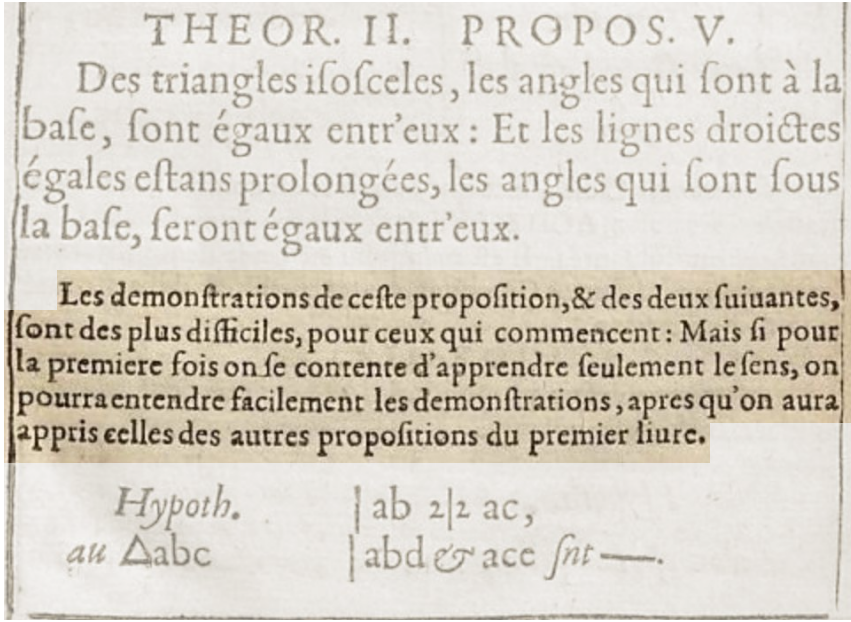
The answers to these questions vary widely, reflecting different motivations and valid contexts.

Which context?

Among various possible contexts, the **educational** context emerges as **justified** and **promising**.

Euclid(?) in 'The School of Athens', Raphael, ca. 1509–11

Didactic comment. Proposition V, Book I, Hérigone, 1639



THEOR. II. PROPOS. V.

Des triangles iſoſceles, les angles qui ſont à la baſe, ſont égaux entr'eux : Et les lignes droictes égales eſtans prolongées, les angles qui ſont ſous la baſe, ſeront égaux entr'eux.

Les demonſtrations de ceſte propoſition, & des deux ſuiuantes, ſont des plus difficiles, pour ceux qui commencent : Mais ſi pour la premiere fois on ſe contente d'apprendre ſeulement le ſens, on pourra entendre facilement les demonſtrations, apres qu'on aura appris celles des autres propoſitions du premier liure.

Hypoth. | ab 2|2 ac,
au △abc | abd & ace ſnt —.

The next section will clarify it by exploring what an educational perspective can entail.

Guiding Questions

1. *What* does each translation add in terms of mathematical content?
2. *How* do these translations aim to teach and present the mathematical content of the Elements?
3. What *social* conditions prompted the production and reception of each translation?

Provisional Assumptions & Hypotheses

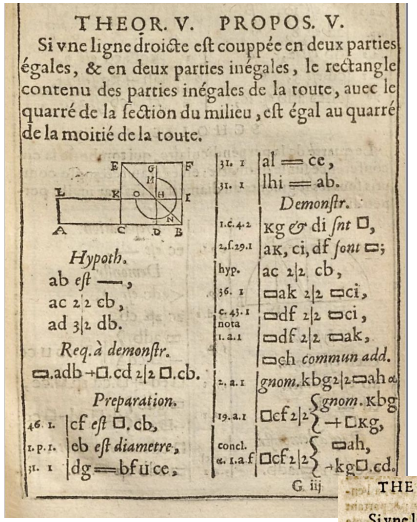
- The social, educational, and mathematical dimensions are *deeply interconnected*.
- The varied educational environments played a role in shaping which mathematical ideas were explored and how they were explored, perhaps even transforming the concepts themselves.
- The Elements served as a focal point where ideas were transformed, explored, repurposed, set aside or resurfaced in different forms and directions.

These interconnected questions require an approach that considers them together rather than in isolation.

The following slides will outline some methods guided by this integrated approach.

Adopting an Educational Perspective: The Mathematical *Content*

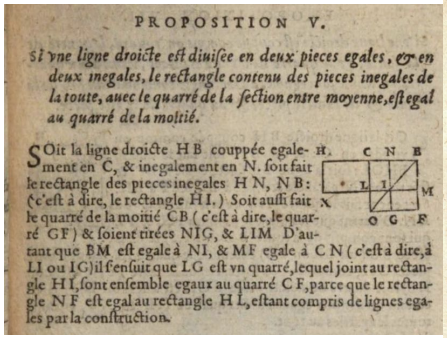
- Which mathematical conceptions were introduced in each translation?
- Which aspects of the mathematical content were adaptable or flexible, and which remained stable throughout the translations and related literature?
- Which changes were explicit, and which were implicit?



THEOR. V. PROPOS. V.

Si vne ligne droicte eſt couppée en deux parties égales, & en deux parties inégales, le rectangle contenu des parties inégales de la toute, auec le quarré de la ſection du milieu, eſt égal au quarré de la moitié de la toute.

Hérigone, 1639



PROPOSITION V.

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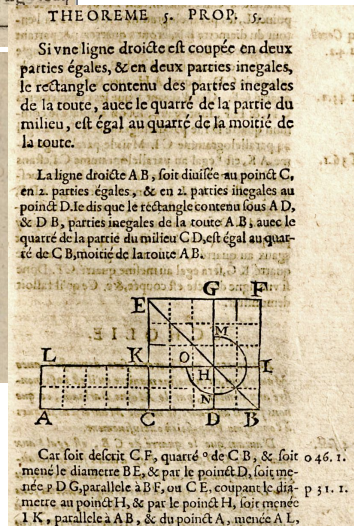
Forcadel, 1564



THEOREME 5. PROP. 5.

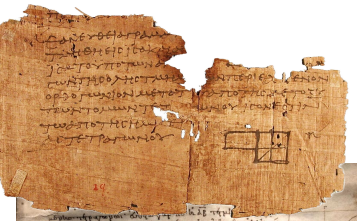
Si vne ligne droicte eſt coupée en deux parties égales, & en deux parties inegales, le rectangle contenu des parties inegales de la toute, auec le quarré de la partie du milieu, eſt égal au quarré de la moitié de la toute.

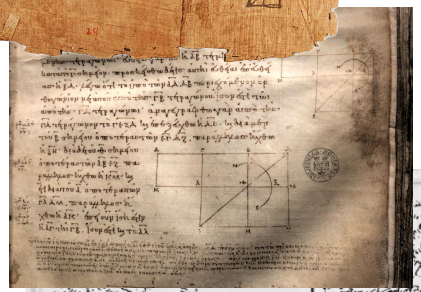
Fournier, 1654

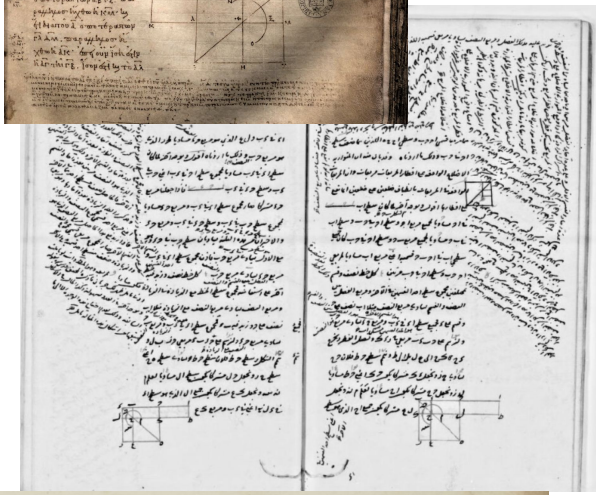
Proposition V, Book II: Three Examples from French Translations

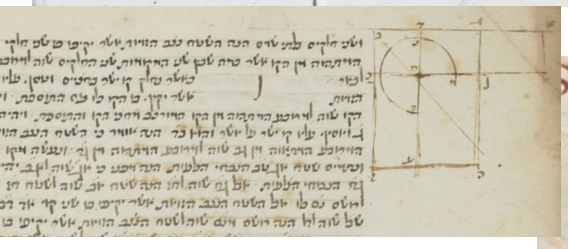
How do traditional and innovative approaches manifest in the translations?

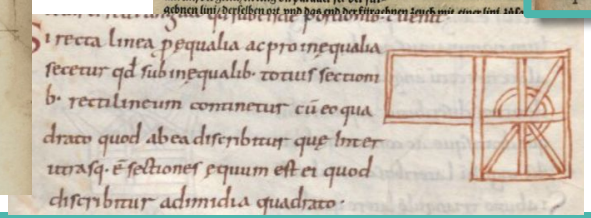
In what ways do they align with, challenge, or expand upon the **Euclidean tradition**?

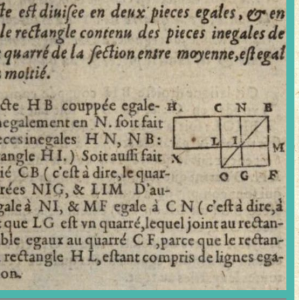


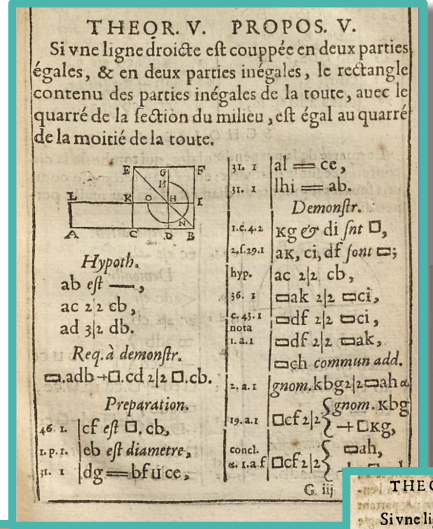


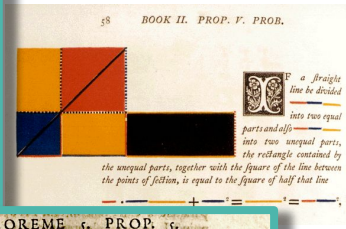


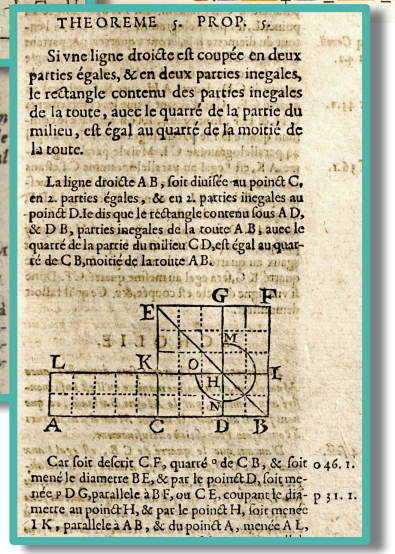




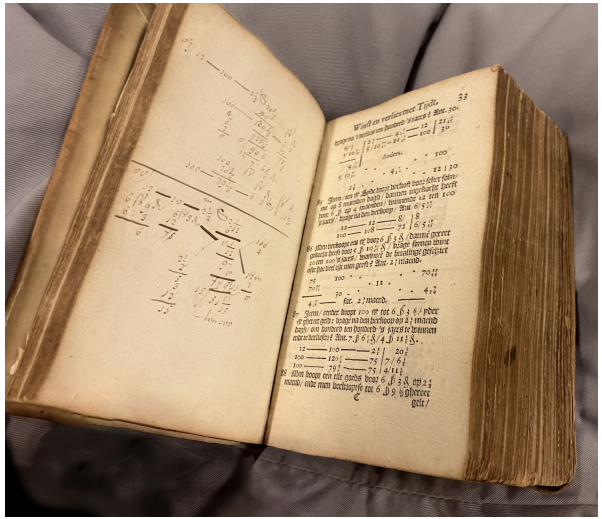




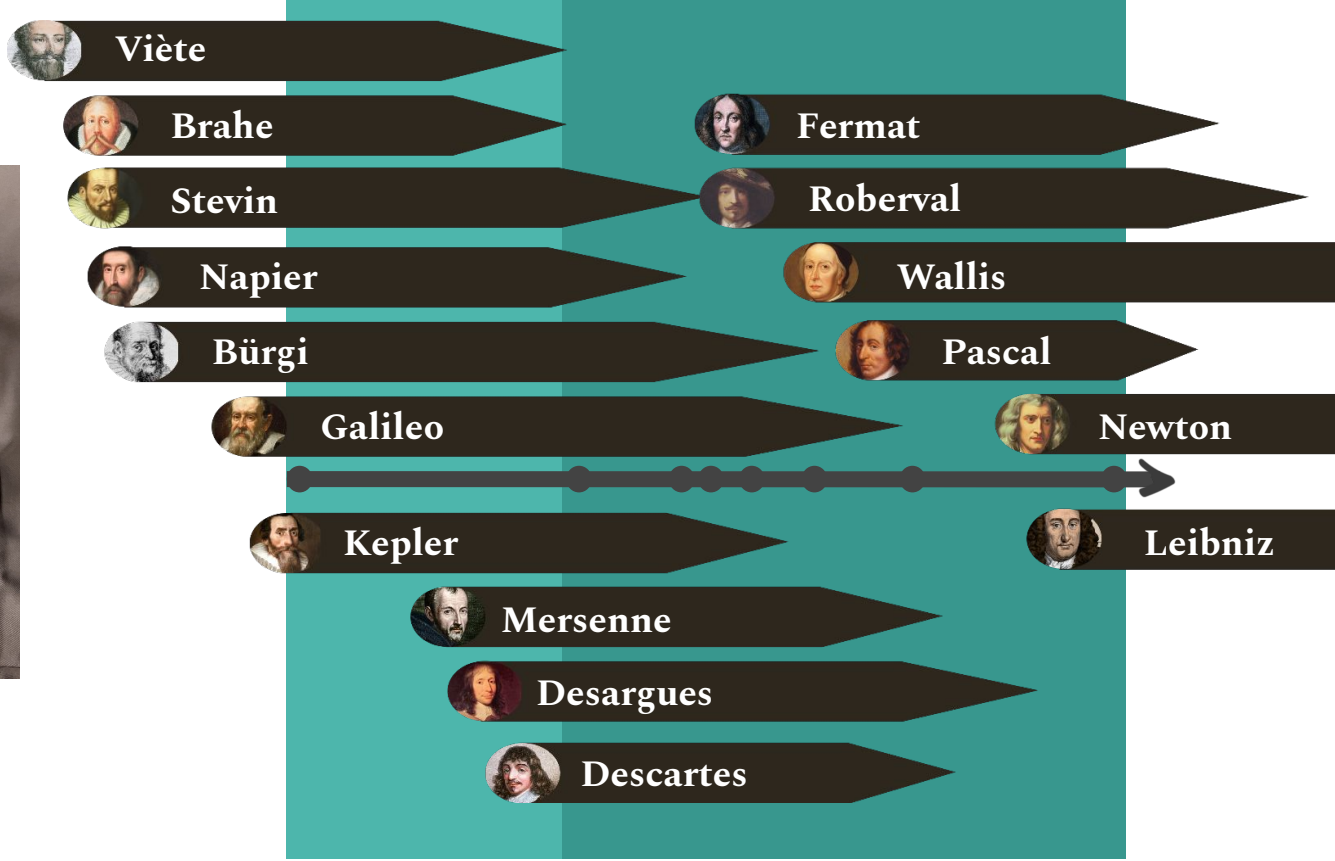




Proposition V, Book II: Selected Examples (ca. 100-1874)



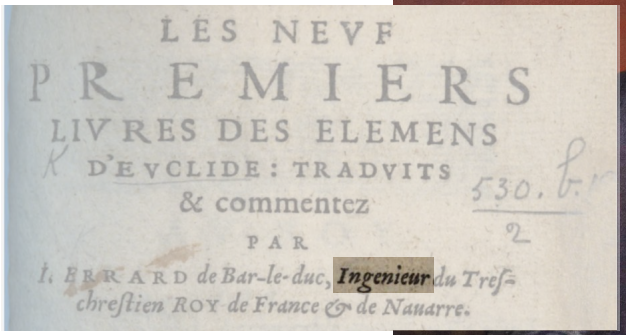
Notebook interleaved with an arithmetic textbook, 1676



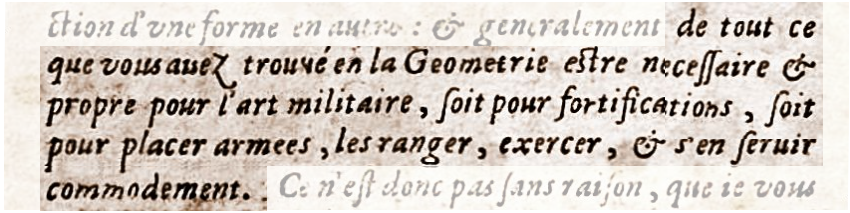
How do the translation engage with both **contemporary** and earlier mathematical concepts, practices and approaches?

Educating the Professionals

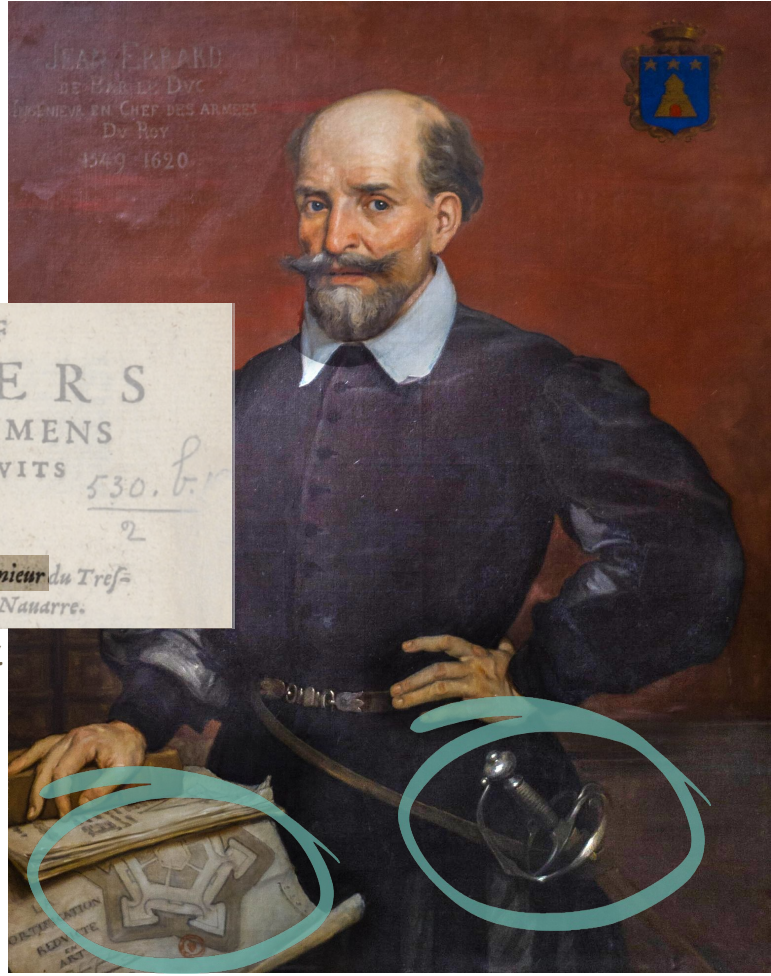
The growing professionalization of fields like engineering, military science, navigation and surveying created an increasing demand for practical mathematical knowledge, likely driving the need for accessible educational books suited to artisans, craftsmen and merchants.


LES NEVF
PREMIERS
LIVRES DES ELEMENS
D'EVCLIDE: TRADVITS
& commentez
PAR
I. ERRARD de Bar-le-duc, Ingenieur du Treſ-
chreſtien ROY de France & de Nauarre.

Author described as "Ingenieur". Title Page, Errard, 1605.


ction d'vne forme en autre : & generalement de tout ce
que vous auez trouué en la Geometrie eſtre neceſſaire &
propre pour l'art militaire, ſoit pour fortifications, ſoit
pour placer armees, les ranger, exercer, & s'en ſeruir
commodement. Ce n'eſt donc pas ſans raiſon, que ie vous

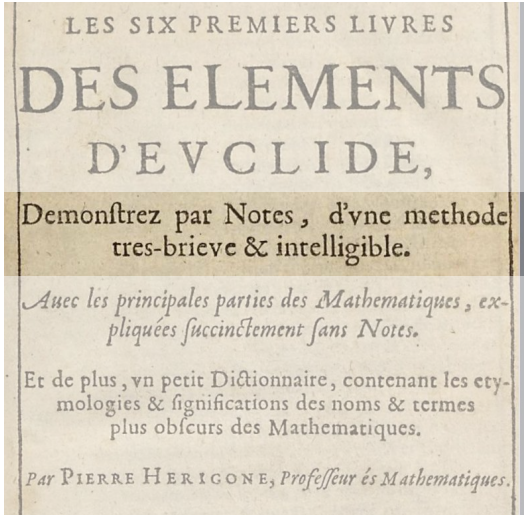
Comment on geometry's military application. À la noblesse françoise, de Tournes, 1628



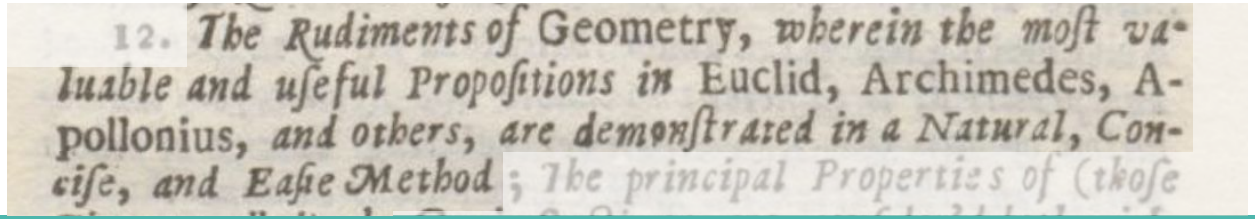
Portrait of Jean Errard, military engineer and translator of the Elements, gesturing toward a fortification diagram

Adopting an Educational Perspective: *How* the Elements Were Presented and Instructed

- **Didactic Strategies:** Might reflect broader approaches and intellectual movements, such as humanism and the Reformation.
- **Educational Objectives**: E.g., emphasis on rigor, practical applicability, and/or clarity.
- **As Part of an Instruction Tradition**: Tracing innovations and traditional methods across translations.
- **Position Among Textbooks, Manuals and Treatises**: Highlights the alignment of the translations' approaches among broader educational resources.
- **Audience Focus**: Techniques variation based on intended audiences.


LES SIX PREMIERS LIVRES
DES ELEMENTS
D'EVCLIDE,
Demonſtrez par Notes, d'vne methode tres-brieve & intelligible.
Auec les principales parties des Mathematiques, expliquées ſuccinctement ſans Notes.
Et de plus, vn petit Dictionnaire, contenant les etymologies & ſignifications des noms & termes plus obſcurs des Mathematiques.
Par PIERRE HERIGONE, *Profeſſeur és Mathematiques.*

Demonstration method advertised. Title page, Hérigone, 1639


12. The Rudiments of Geometry, wherein the moſt valuable and uſeful Propoſitions in Euclid, Archimedes, Apollonius, and others, are demonſtrated in a Natural, Conciſe, and Eaſie Method; The principal Properties of (thoſe

Geometry chapter summary. Synopsis palmariorum matheseos, W. Jones, 1706

How Can We Examine the *How*? Layout, Style, Structure and Language

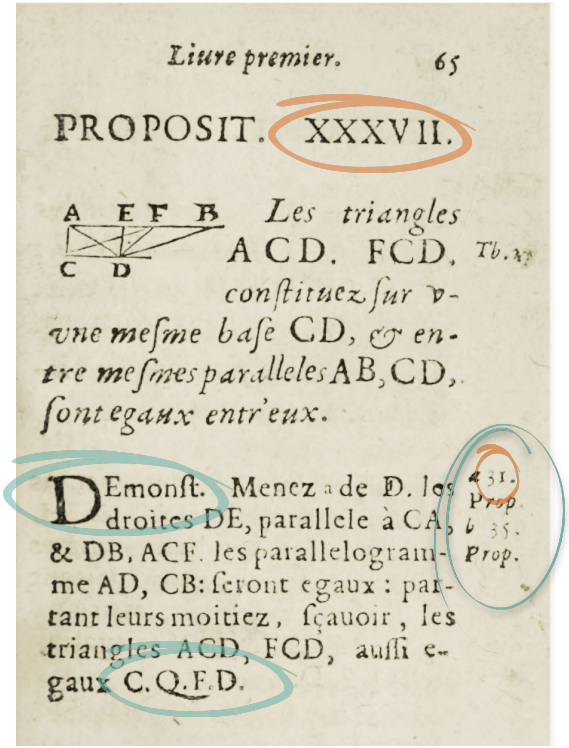
- Conveys educational objectives and priorities, such as emphasizing demonstration rigor, practical application, or clarity.
- Differentiates and highlights the roles of various components, e.g. enunciations and demonstrations.
- Facilitates the comparison of these works with contemporary publications, noting similarities or structural differences.

Roman numerals are used in headings; Hindu-Arabic numerals are used within the body.

MAJUSCULE ROMAN

Italics

Roman



Liure premier. 65

PROPOSIT. XXXVII.

A E F B
C D

Les triangles ACD. FCD. Tb. 33 conſtituez ſur vne meſme baſe CD, & entre meſmes paralleles AB, CD, ſont egaux entr'eux.

DEmonſt. Menez de D. les droites DE, parallele à CA, & DB, ACF. les parallelogrammes AD, CB: ſeront egaux: partant leurs moitiez, ſçauoir, les triangles ACD, FCD, auſſi egaux C.Q.F.D. 31. Prop. 35. Prop.

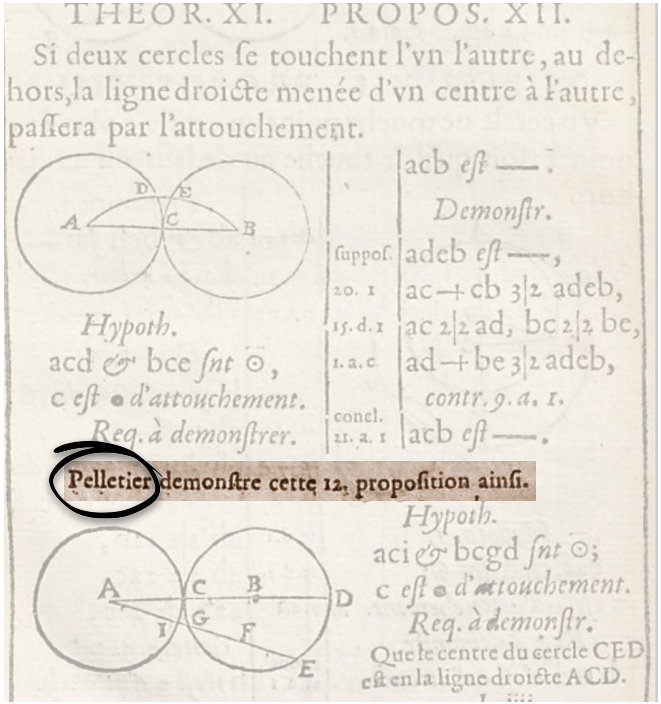
Fournier, 1654

*Terms like "Demonst." and "C.Q.F.D.," and the type **signal** the structure of the demonstration.*

Adopting an Educational Perspective: French-Speaking Early 17th Century Education Landscape

- Shifting roles and dynamics between universities and colleges.
- Influence of Jesuit instruction.
- A curriculum blending scholastic and humanist traditions.
- Expanded readership, including navigators, engineers and merchants among others, whose professions increasingly demanded some mathematical expertise.
- Print as a source of new challenges and opportunities.
- Religious climate marked by tension, unrest and conflict.
- Latin vs. French and vernaculars shifts.
- A vibrant mathematical environment, including new innovations and vital communication.

The Relationships and People Behind the Pages



THEOR. XI. PROPOS. XII.

Si deux cercles ſe touchent l'vn l'autre, au dehors, la ligne droicte menée d'vn centre à l'autre, paſſera par l'attouchement.

Hypoth.
acd & bce ſnt ⊙,
c eſt ● d'attouchement.
Req. à demonſtrer.

acb eſt —.
Demonſtr.
ſuppoſ. adeb eſt —,
20. 1 ac + cb 3|2 adeb,
15. d. 1 ac 2|2 ad, bc 2|2 be,
1. a. c ad + be 3|2 adeb,
contr. 9. a. 1.
concl. 21. a. 1 acb eſt —.

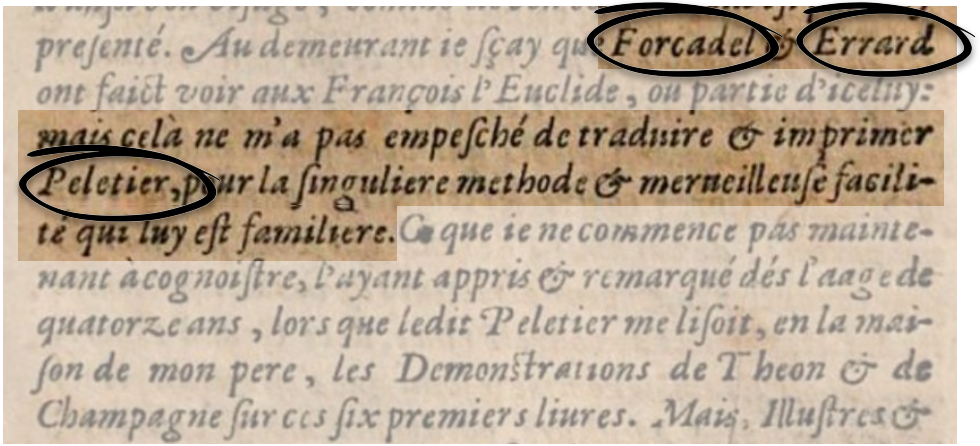
Pelletier demonſtre cette 12. propoſition ainſi.

Hypoth.
aci & bcgd ſnt ⊙;
c eſt ● d'attouchement.
Req. à demonſtr.
Que le centre du cercle CED eſt en la ligne droicte ACD.

Reformulating Peletier's alternative demonstration of Proposition XII, Book III, Hérigone, 1639.

Who were the main contributors to these translations? Authors, educators, printers, publishers, etc.

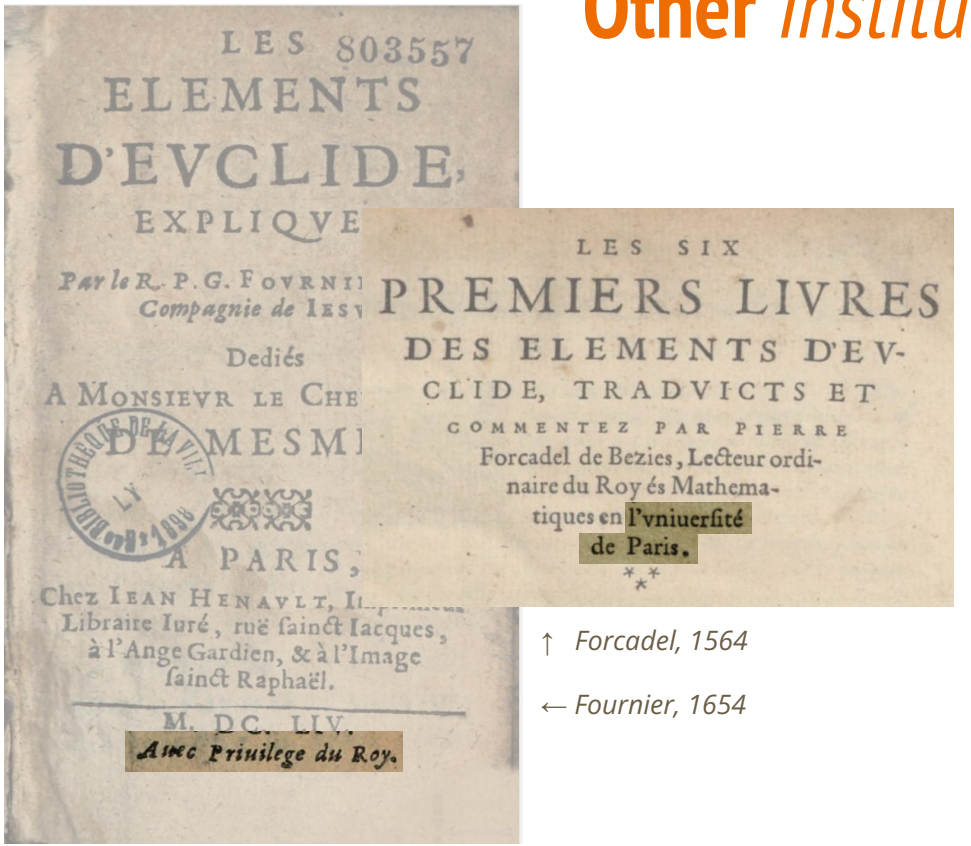
How did their professional ties, backgrounds, and networks shaped the translation?



preſenté. Au demeurant ie ſçay qu'Forcadel & Errard ont faict voir aux François l'Euclide, ou partie d'icelluy: mais cela ne m'a pas empeſché de traduire & imprimer Peletier, pour la ſinguliere methode & merueilleuſe facilité qui luy eſt familiere. Ce que ie ne commence pas maintenant à cognoiſtre, l'ayant appris & remarqué dés l'aage de quatorze ans, lors que ledit Peletier me liſoit, en la maiſon de mon pere, les Demonſtrations de Theon & de Champagne ſur ces ſix premiers liures. Mais, Illuſtres &

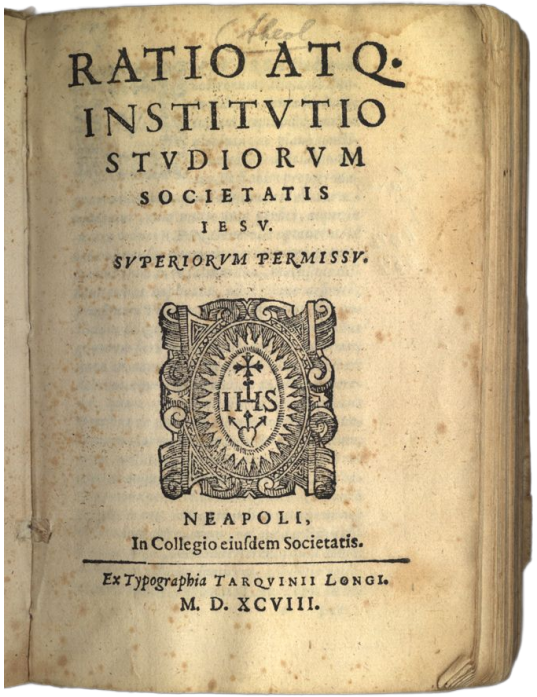
References to previous translations of the Elements.
À la noblesse françoise, de Tournes, 1628.

Considering Educational, Print, and Other *Institutions*



↑ *Forcadel, 1564*

← *Fournier, 1654*



Jesuit education regulations title page. Ratio Studiorum, 1598.

The Material Dimension

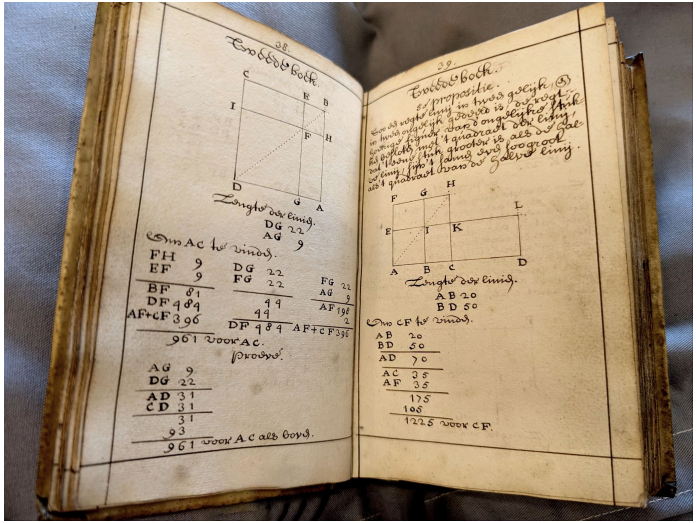
- The book's size, format, and binding reveal much about presentation, intended audience, readership and more.

- These aspects relate to both the *how* of the instruction, but also give us a glimpse into the *who*: the various people involved in the book's production, dissemination and conception.

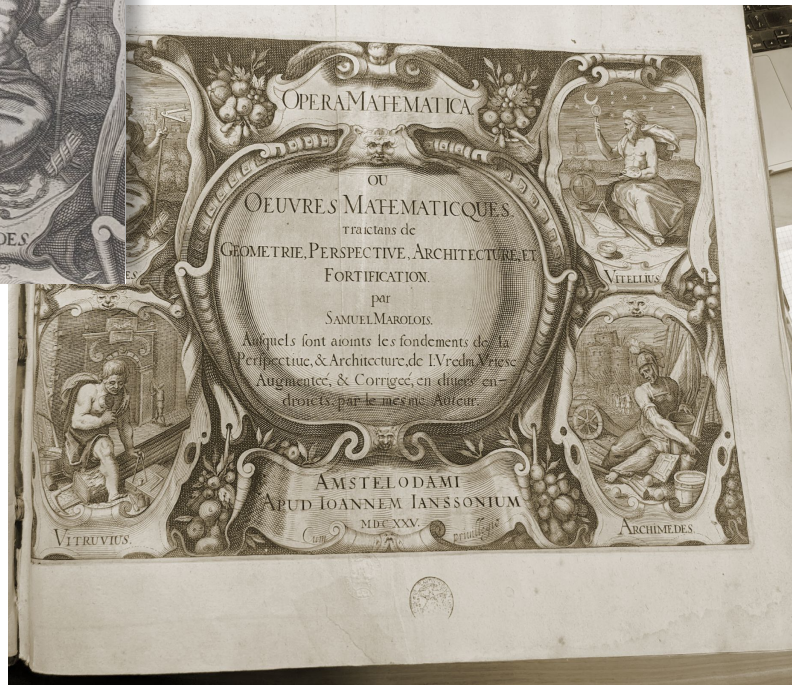
Partly restored contemporary binding, in-folio Latin translation. d'Étaples, 1516

Long-stitch binding, in-12 Dutch translation. Van Schooten, 1617

Thinking About Euclid as a Hallmark



Dutch translation, 1683



Euclid's engraving, Opera matematica, Marolois, 1625

Acknowledging the Continued Relevance of *Manuscript Materials*

Following Recent Scholarly Developments:
The Divide Between External and Internal History of Mathematics

- In recent years, the socio-cultural perspective became more prominent in the history of mathematics.
- These works do not construct an externalist social history of mathematics.
- Multiple researchers in the past few decades successfully transcended the traditional dichotomy between internalist and externalist history of an intellectual discipline, weaving the technical and socio-cultural aspects together.

Following Recent Scholarly Developments:
Early Modern Education Books

- Educational studies often focus on *textbooks* as a source for understanding how knowledge is structured and transmitted across generations
- *Textbooks* are often viewed as works authored by contemporaries and designed to offer a condensed and elementary introduction to a subject in a simplistic style for students, sometimes mitigating the “original”, frequently classical, texts.
- In what senses the vernacular Elements can indeed be analyzed as a textbook? An educational Book? In what senses does it differ?

Connecting the Threads: A Recap

Numerous and Varied French Translations from the First Half of the 17th Century

Why?

Read in Context

Which?

Educational

How can we adopt this lens?

Guiding Perspective

Present the mathematical landscape as a "beautiful mess"—a set of complex, non-linear interactions of ideas, individuals and groups that converged in a few key sites, one of which was the educational sphere, particularly through the medium of the Euclidean text.

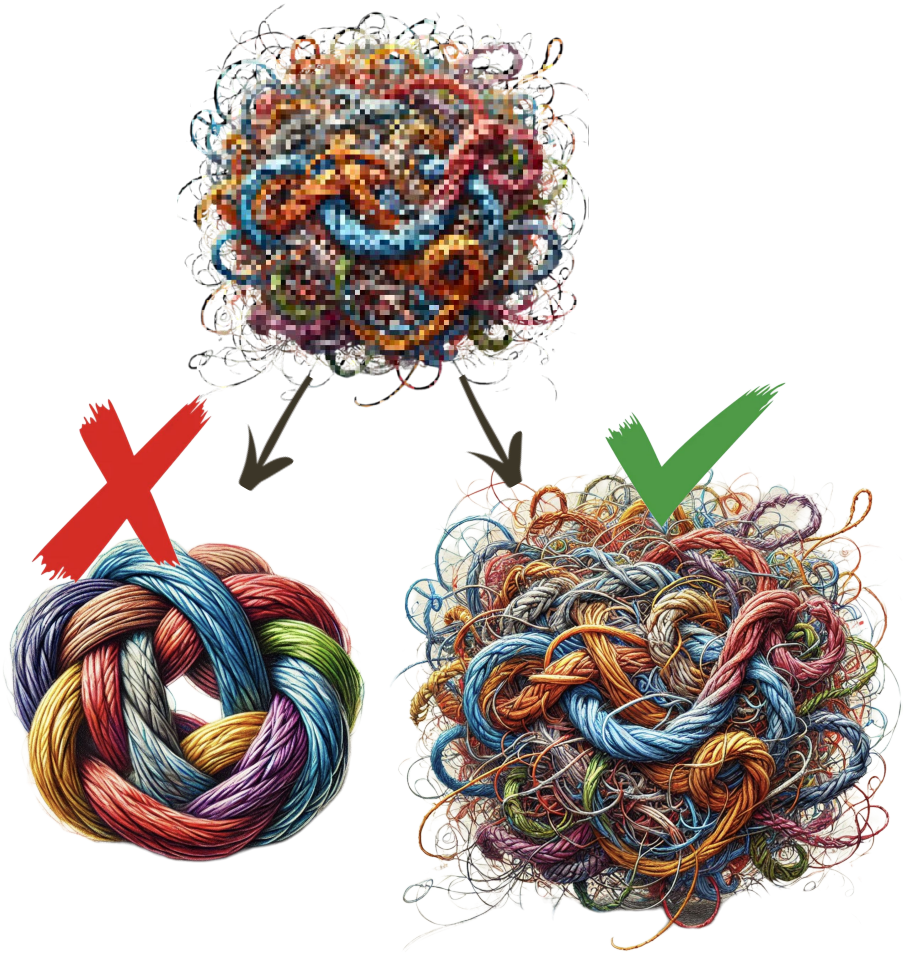
Fill in details, clarify the intricate links, without untangling them.

Guiding Qs

1. What content was taught?
2. How was it instructed and presented?
3. Who was engaged with the books and the mathematical education sphere?

How can we approach these Qs?

- ➔ Sub Qs
- ➔ Methodology teasers
- ➔ Recent scholarly development



Connecting the Threads: A Recap

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Thank you!

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