

Open translations in mathematics

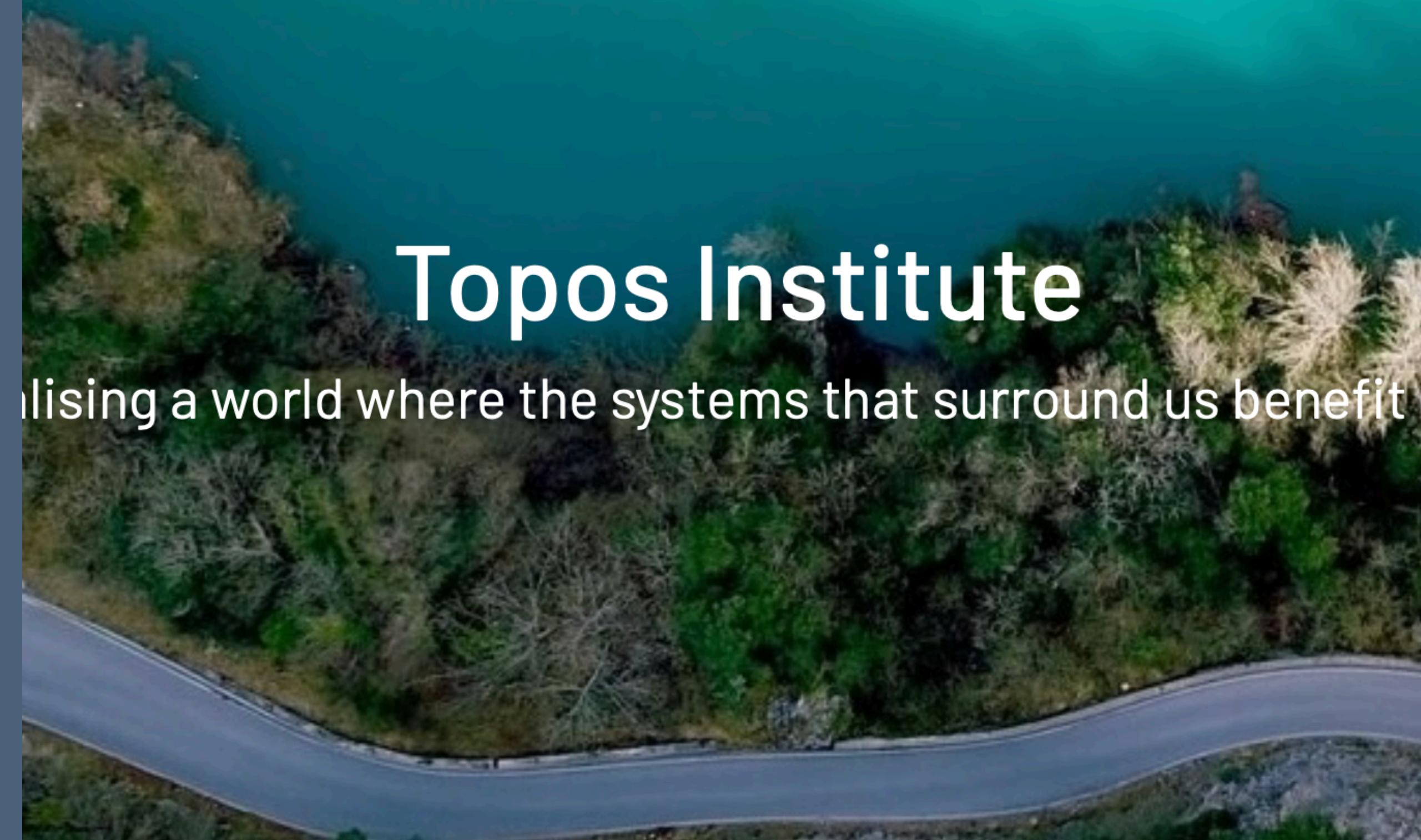
Community building and resources for the future

Tim Hosgood (Topos Institute)
24th of February, 2025

*Warning: I am merely a
mathematician*

Topos Institute

A mission-driven non-profit
research institute



Topos Institute

Building a world where the systems that surround us benefit

Who are we?

We are a mission-driven non-profit research institute

In a complex and changing world, how can we build a society in which all people and communities can flourish? We believe technology can play a pivotal role, but only if well-crafted to be responsive to the values, care, and meaning we each hold.

We research, build, and serve others through new technologies that enable cooperation across difference. We seek to both advance humanity's capacity for knowledge and compassion, and to help address the pressing, systemic challenges of our time, includin

We do not "solve" the "problem"
of translation by imposing a
universal language

The "problem" becomes a
benefit if we promote *more*
languages and get better at
translation

*I would like more and more
of these workshops, not
fewer and fewer*

Plan

1. Translation in the context of science
2. Previous projects, large and small
3. Useful tools
4. Difficulties
5. Future resources

1. Translation in the context of science

Translation is that which
transforms everything so
that nothing changes

— one of the first Google results for "quotes about translation"

Scientific (as opposed to literary) translation

Simpler? Less subjective?

- Not really, no. [citation: books; the rest of this talk; the rest of this fortnight]

Scientific (as opposed to literary) translation

Things to consider, both big and small

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Adam Huttner-Koros —
English: a hegemony

theatlantic.com/science/archive/2015/08/english-universal-language-science-research/400919/

Eureka!

Heureka!

~~Heureka!~~

Eureka!

~~Voilà!~~

~~ЭВРИКА!~~

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- [...] In short, scientists who want to produce influential, globally recognized work most likely need to publish in English—which means they'll also likely have to attend English-language conferences, read English-language papers, and have English-language discussions.

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- [...] In short, scientists who want to produce influential, globally recognized work most likely need to publish in English—which means they'll also likely have to attend English-language conferences, read English-language papers, and have English-language discussions.
- [...] “domain collapse,” or “the progressive deterioration of competence in [a language] in high-level discourses.” In other words, as a language stops adapting to changes in a given field, it can eventually cease to be an effective means of communication in certain contexts altogether.

Eureka!

~~Eureka!~~

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~~Eureka!~~

~~Voilà!~~

~~Brilliant!~~

Minhyong Kim —
*Who Owns Mathematics:
A Question of Identity*

[topos.institute/events/topos-colloquium/slides/
2023-11-30.pdf](https://topos.institute/events/topos-colloquium/slides/2023-11-30.pdf)

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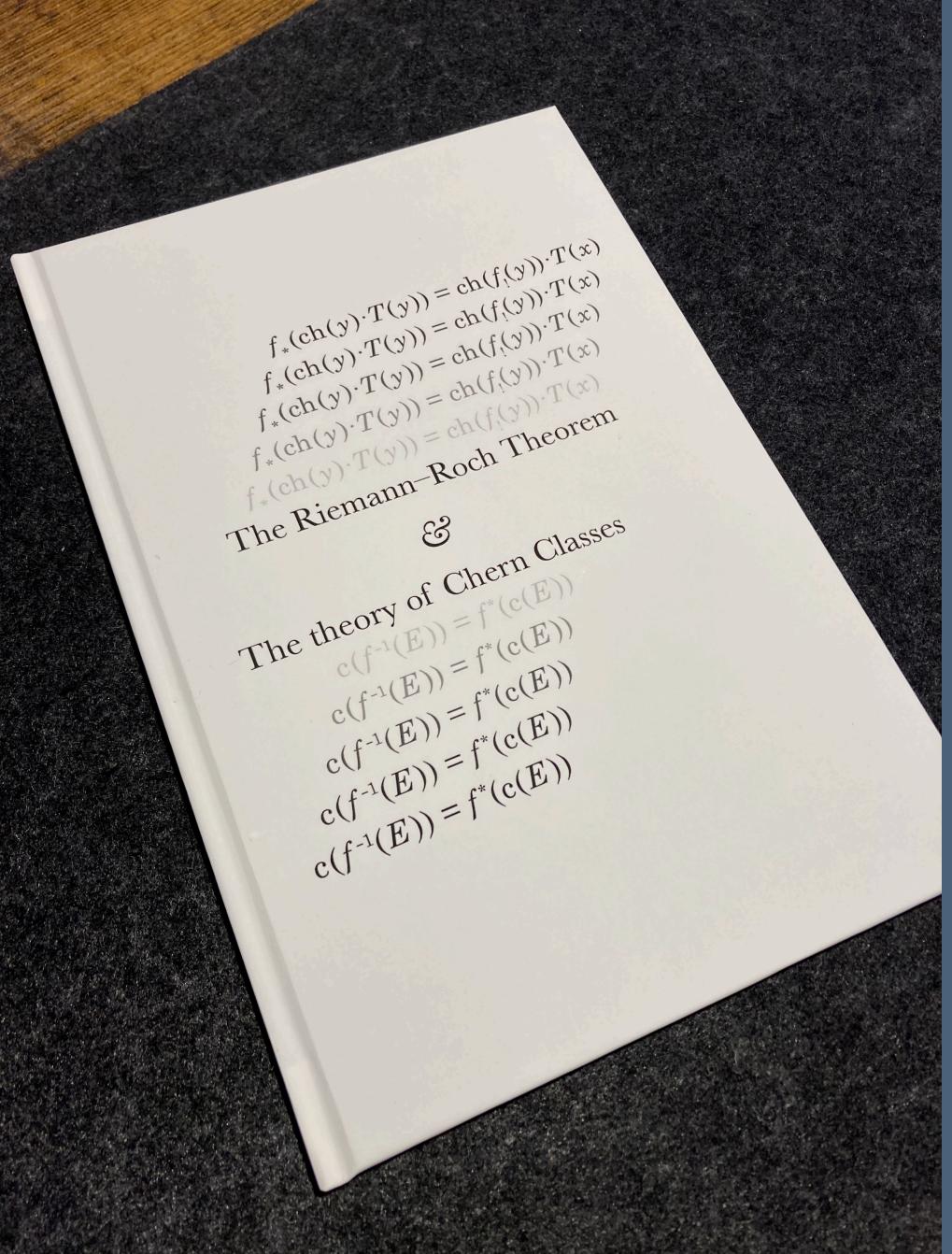
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- **We will all be included in a book on the global history of the English written by a future historian.**

English translations as a stepping stone

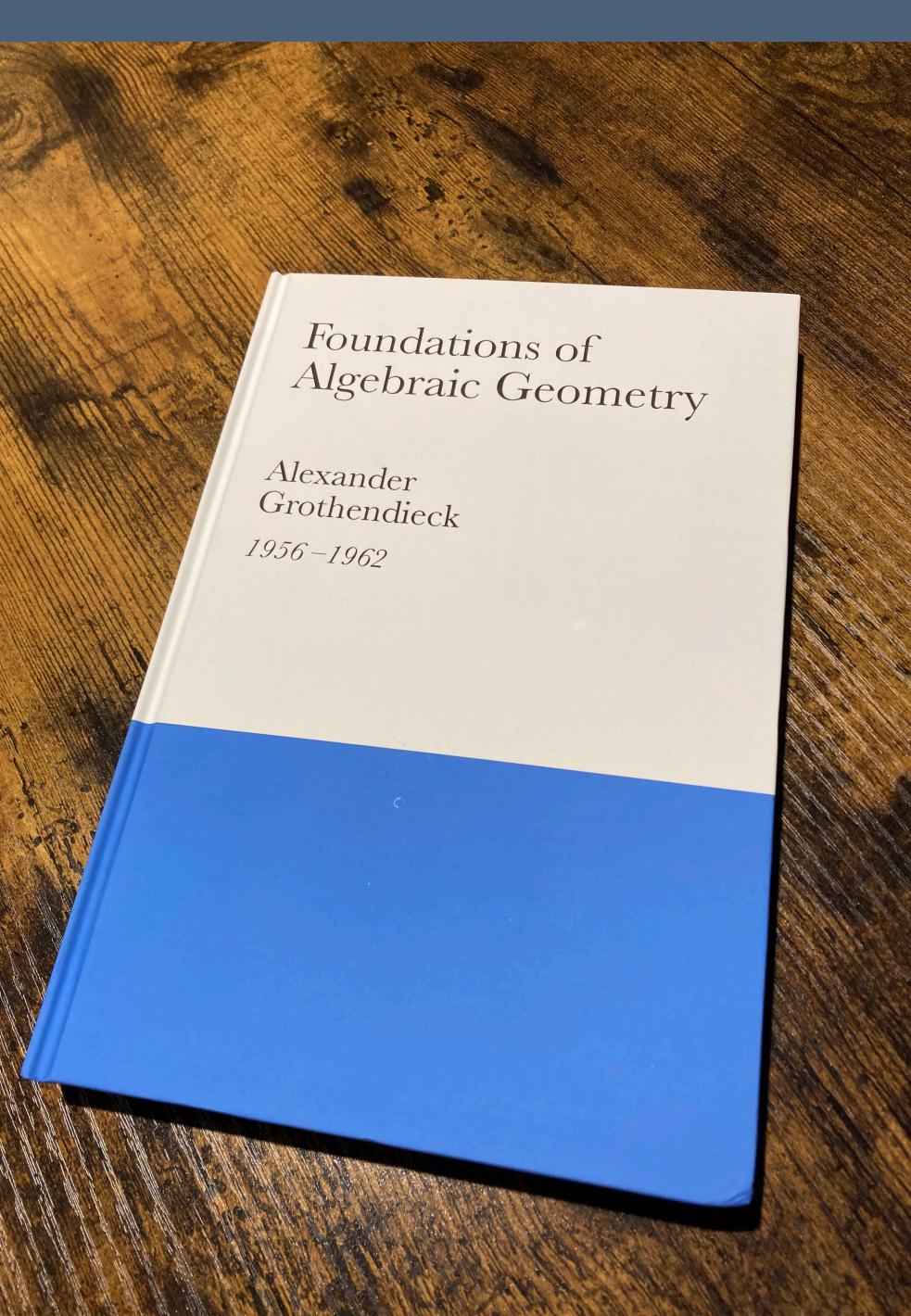
Acting intentionally

- English is, for better or worse, the most lingua franca of languages for science...
- ... *but this doesn't mean we should stop there*
- Translating a specific text into English is a good way of building a community around that work, and laying the foundations (technical and cultural) for translations into other languages
- Our choice of texts to translate can help to *highlight* non-English sources

2. Previous projects, large and small



Screenshot of the GitHub repository for 'sga' (Séminaire de Géométrie Algébrique du Bois Marie). The repository has 12 stars, 4 forks, and 31 commits. It includes sections for About, Contributors (thosgood, tim-at-topos, Firmaprim, dependabot[bot]), Deployments (162), and Languages (JavaScript). A note at the bottom states: "This translation is currently offline for some big technical upgrades, but should hopefully be back again soon. In the meantime, check out the [GitHub repository](#)".



- ## Articles
- M Balazard, E Saias, M Yor. "Notes sur la fonction ζ de Riemann, 2". *Adv. in Math.* 143 (1999) pp. 284–287.
[web](#) | [PDF](#) | [source](#)
[original](#)
 - A Borel, J-P Serre. "Le théorème de Riemann-Roch". *Bull. Soc. Math. Fr.* 86 (1958) pp. 97–136.
DOI: [10.24033/bsmf.1500](https://doi.org/10.24033/bsmf.1500)
[web](#) | [PDF](#) | [source](#)
[original](#)
 - P Deligne. "Variétés abéliennes ordinaires sur un corps fini". *Inv. Math.* 8 (1969) pp. 238–243.
[web](#) | [PDF](#) | [source](#)
[original](#)
 - P Deligne. "Théorie de Hodge I, II".
(I) *Actes du Congrès intern. math.* 1 (1970) pp. 425–430.
(II) *Pub. Math. de l'IHÉS* 40 (1971) pp. 5–58.
[web](#) | [source](#)
[original \(I\)](#) | [original \(II\)](#)
 - P Deligne. "A quoi servent les motifs?". *Proc. Symp. in Pure Math.* 55 (1994) pp. 143–161.
[web](#) | [PDF](#) | [source](#)
[original](#)
 - Y Diers. "Catégories Multialgébriques". *Archiv der Math.* 34 (1980) pp. 193–209.
DOI: [10.1007/BF01224953](https://doi.org/10.1007/BF01224953)
[PDF](#) | [source](#)
 - P Donato, P Iglesias. "Exemples de groupes différentiels: flots irrationnels". *C. R. Acad. Sc. Paris Sér. I* 301 (1985) pp. 127–130.

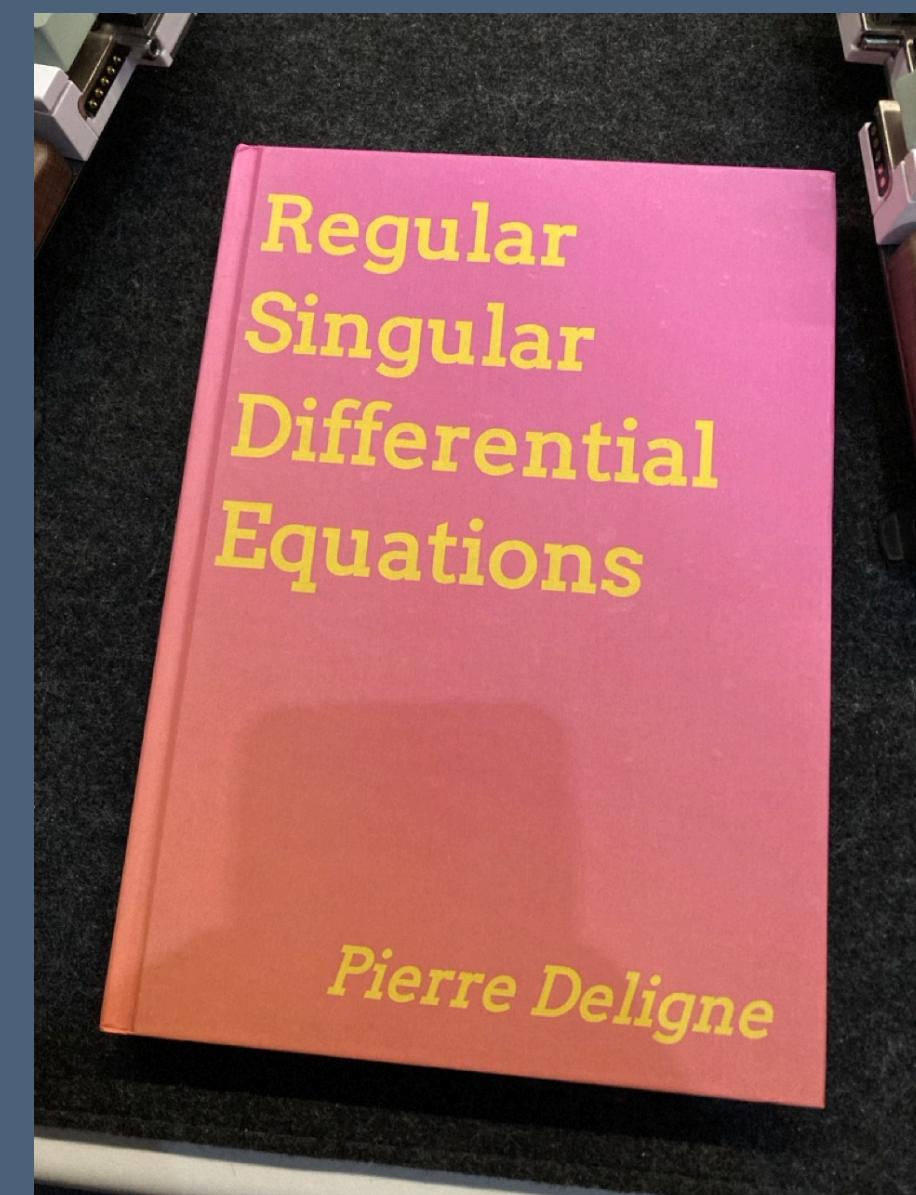
- ## Seminars
- Séminaire Bourbaki, Extracts (1948–49), "Les travaux de Koszul"**
In the first series of the Séminaire Bourbaki, H Cartan gave three talks concerning the work of J-L Koszul on Lie algebras. (These specific talks were given in 1948–49, but first published Séminaire Bourbaki collection was printed in 1952, containing the first talks, and dating from 1948 up until 1951). I have combined all three talks into one document.
- H Cartan. "Les travaux de Koszul, I, II, and III".
Séminaire Bourbaki 1 (1952) pp. Talks no. 1, 8, and 12.
[web](#) | [PDF](#) | [source](#)
[original \(I\)](#) | [original \(II\)](#) | [original \(III\)](#)
 - Séminaire Claude Chevalley, Volume 4 (1958–59), "Variétés de Picard"**
 1. P Gabriel. "Faisceaux quasi-cohérents".
[web](#) | [PDF](#) | [source](#)
[original](#)
 2. P Gabriel. "Le théorème de Serre".
[web](#) | [PDF](#) | [source](#)
[original](#)
 4. C S Seshadri. "Diviseurs en géométrie algébrique".
[web](#) | [PDF](#) | [source](#)
[original](#)
 9. A Douady. "Variétés abéliennes".
[web](#) | [PDF](#) | [source](#)
[original](#)

Séminaire Henri Cartan, Volume 9 (1956–57), "Quelques questions de topologie"

 2. A Grothendieck. "Sur les faisceaux algébriques et les faisceaux analytiques"

Screenshot of the GitHub repository for 'ega' (amateur translation project of Grothendieck's EGA). The repository has 27 stars, 35 forks, and 337 commits. It includes sections for About (amateur translation project of Grothendieck's EGA), Releases (2024-02-16 commit 114c6d...), Packages (No packages published), and Contributors (9). A note at the bottom states: "Merge pull request #209 from youngsoo-math/master" and "on Feb 16, 2024".

mostly French,
algebraic geometry
and category theory
(because this is my
background)



EGA

Some history

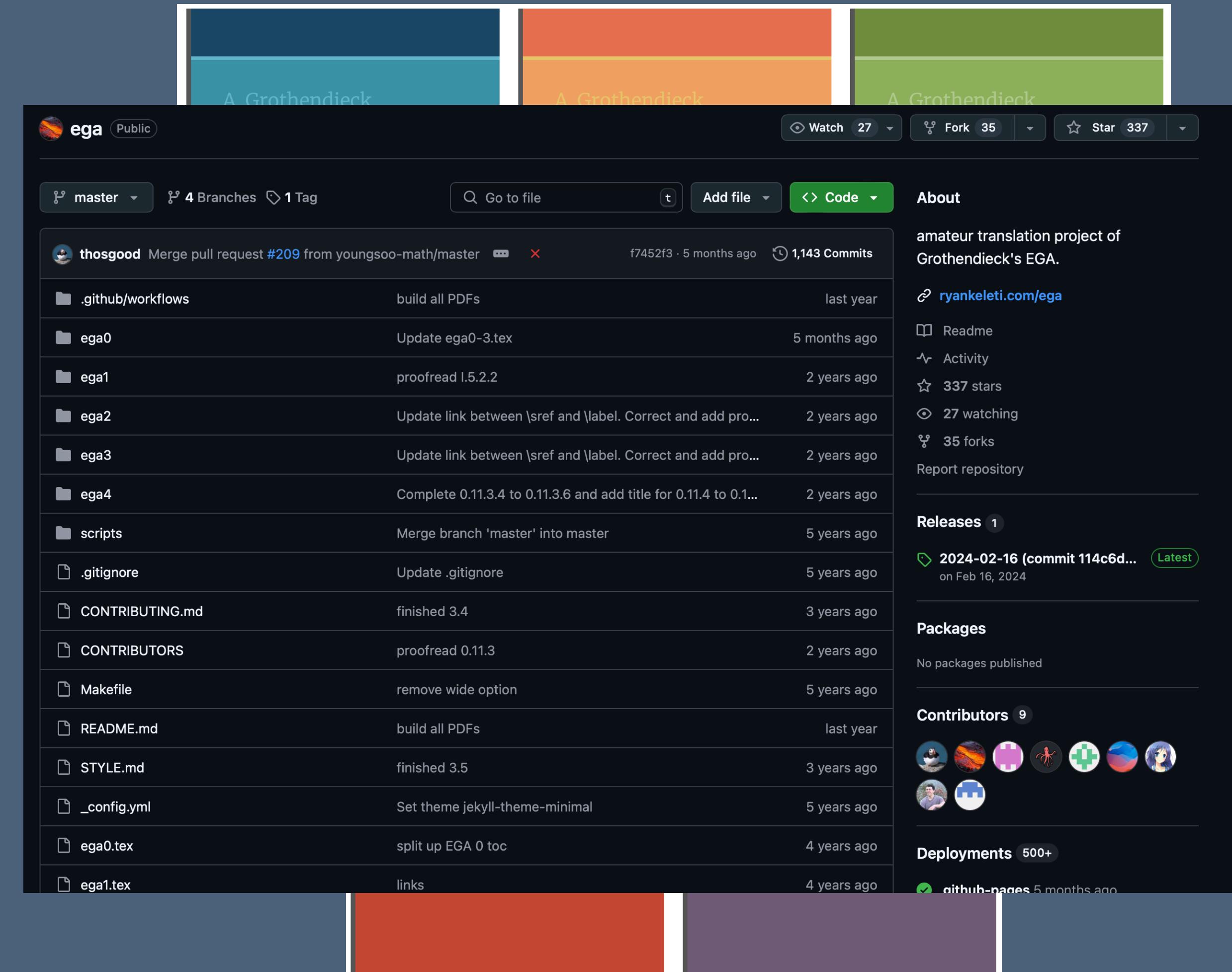
- Foundational work in algebraic geometry, category theory, sheaf theory, ...
- Written throughout the 1960s by Grothendieck and Dieudonné
- Never fully completed, only (!) ~1,800 pages published
- Still the standard reference for many statements for the contemporary working geometer
- (My initial motivation for translation)



EGA

The translation

- Translation mainly joint with Ryan Keleti, but some other (~6) community contributions too
- ~500 pages (~25,000 lines) already translated (EGA I and II, and the corresponding parts of EGA 0)...
- ... ~1,300 pages left
- >300 stars on GitHub, lots of MathOverflow upvotes
- but... why? We have the Stacks project, and "mathematical French is easy"



EGA

Some reasons (good and/or bad) for an English translation

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- It's an excuse for me to read it
- It's an opportunity for (often early-career) mathematicians to build a community

Grothendieck's '91 letter to Thomason on Derivators

Examples of the difficulties of translating mathematical letters

- Cultural context, such as sayings and profanity:
 - *Having looked at this work (if we can call it that) with attention, I am happy that it is not yours — it made me gnash my teeth from start to finish, and more besides.*
 - *[...] you are very capable of finding where it screws up by yourself [...]*
- Writing style of the author:
 - *This will probably be my next letter, if you are interested in continuing this correspondence. In which case I will be very happy to have you as an interlocutor of my cogitations!*

Two of C. Ehresmann's papers on double categories

In the context of his Collected Works, edited by A. Ehresmann

- Somewhat nonstandard (by today's writing) notation and definitions (e.g. functors/functions)
- One of the original works on double categories, but largely unread by many working in the double categorical renaissance currently underway
- Contextualised within a Collected Works, including errata and addenda *in English* by A. Ehresmann
 - These give authoritative translations for terminology that has not elsewhere (as far as I can tell) been translated
- Andrée was very happy with the possibility of wider readership

Multilingual maths dictionary

Open source, community written

- ~50 contributors in 16 languages
- ~300 entries, each linked to Wikidata
- Semi-automated Wikidata imports to be checked by native speakers
- Large Catalan and Basque contributions, at high technical level
- Just one large .json file
- Grammatical gender, but no plurals/cases/etc.

Part of the [Multilingual Mathematics project](#): [mulima.xyz](#)
Source code: [\[thosgood/maths-dictionary\]](#)

To contribute, either submit a PR on GitHub, use the [\(beta\) submission tool](#), or just contact me directly!

Català Euskara Italiano Polski
 Deutsch فارسی 日本語 Português
 English Suomi 한국어 Русский
 Español Français Türkçe 汉语

Any entries that appear like this are ones that have not been manually checked by a native speaker.
If the table does not load, try refreshing the page.
If you only see empty rows, try clicking the language name in the table header to change the sorting.

10 entries per page Search:

Reference	EN	FA	FR
Q318737	abelian category	رسنہ آبلی	catégorie abélienne (f)
Q181296	abelian group	گروہ آبلی	groupe abélien (m)
Q515874	abscissa		abscisse (f)
Q120812	absolute value		valeur absolue (m)
Q91134251	absolutely convergent series		série absolument convergente (f)
Q844451	acnode	نقطه منزوى	point isolé (m)
Q3250296	acute angle		angle aigu (m)
Q32043	addition	جمع	addition (f)
Q4681343	additive category	رسنہ جمع پذیر	catégorie additive (f)
Q320346	adherence		adhérence (f)

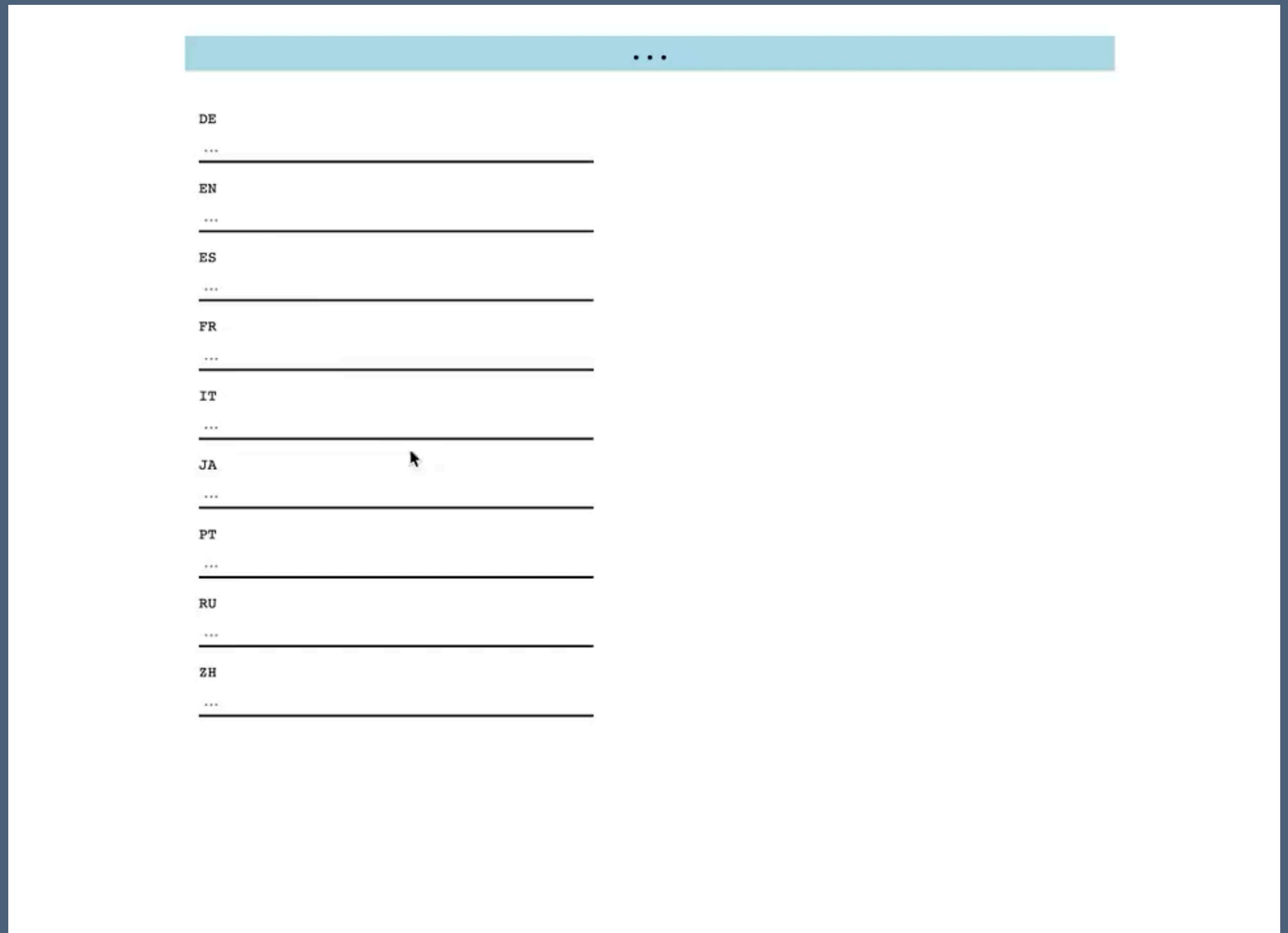
Showing 1 to 10 of 316 entries

« < 1 2 3 4 5 ... 32 > »

Parsers and a DSL

Imagining tailored technologies

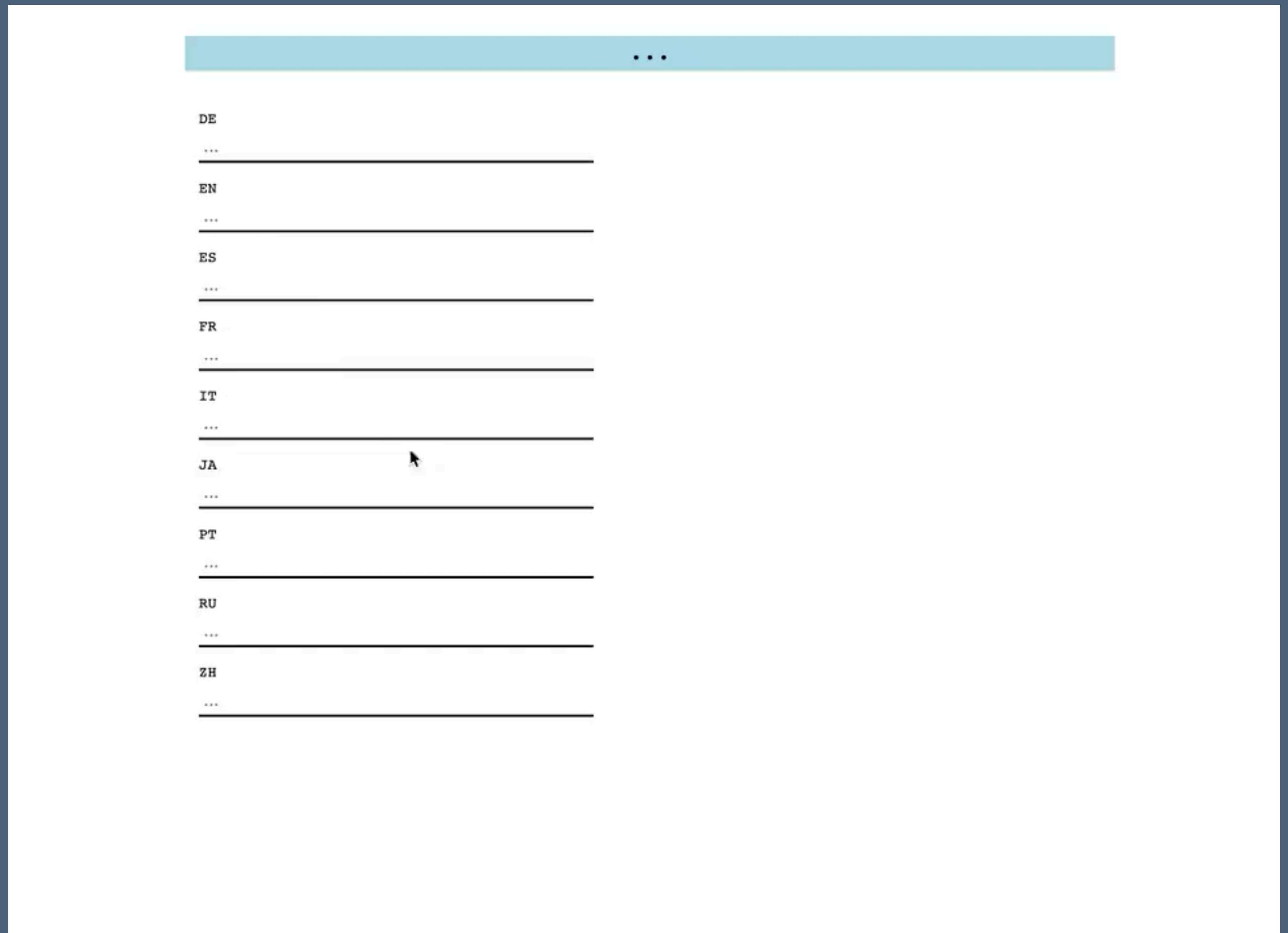
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- Parser-based, non-statistical
- Plugs in to the maths dictionary
- "Scratch/Lego for writing Bourbaki"
- Similar (in some sense) to the Formal Abstract project



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3. Useful tools

Contemporaneous work (and later)

For specific terminology, but also general sentence construction

- Other texts by the same author?
- Other texts published in the same volume/book?
- Reprints (collected works)?
- Commentaries, reviews, summaries?
- Textbooks (if available)?
- Texts that cite it?
- MathOverflow, or even Wikipedia?

Wikipedia and Wikidata

Fantastic when it's fantastic

algebra over a field (Q1000660)

vector space equipped with a bilinear product
algebra

[In more languages](#)
[Configure](#)

Language	Label	Description	Also known as
default for all languages	No label defined	—	
English	algebra over a field	vector space equipped with a bilinear product	algebra
French	algèbre sur un corps	No description defined	algèbre
German	Algebra über einem Körper	Vektorraum über einem Körper, der um eine mit der Vektorraumstruktur verträgliche Multiplikation erweitert wurde	Algebra über K K-Algebra Algebra über einem Körper K Algebra
Spanish	álgebra sobre un cuerpo	No description defined	álgebra sobre un cuerpo algebra

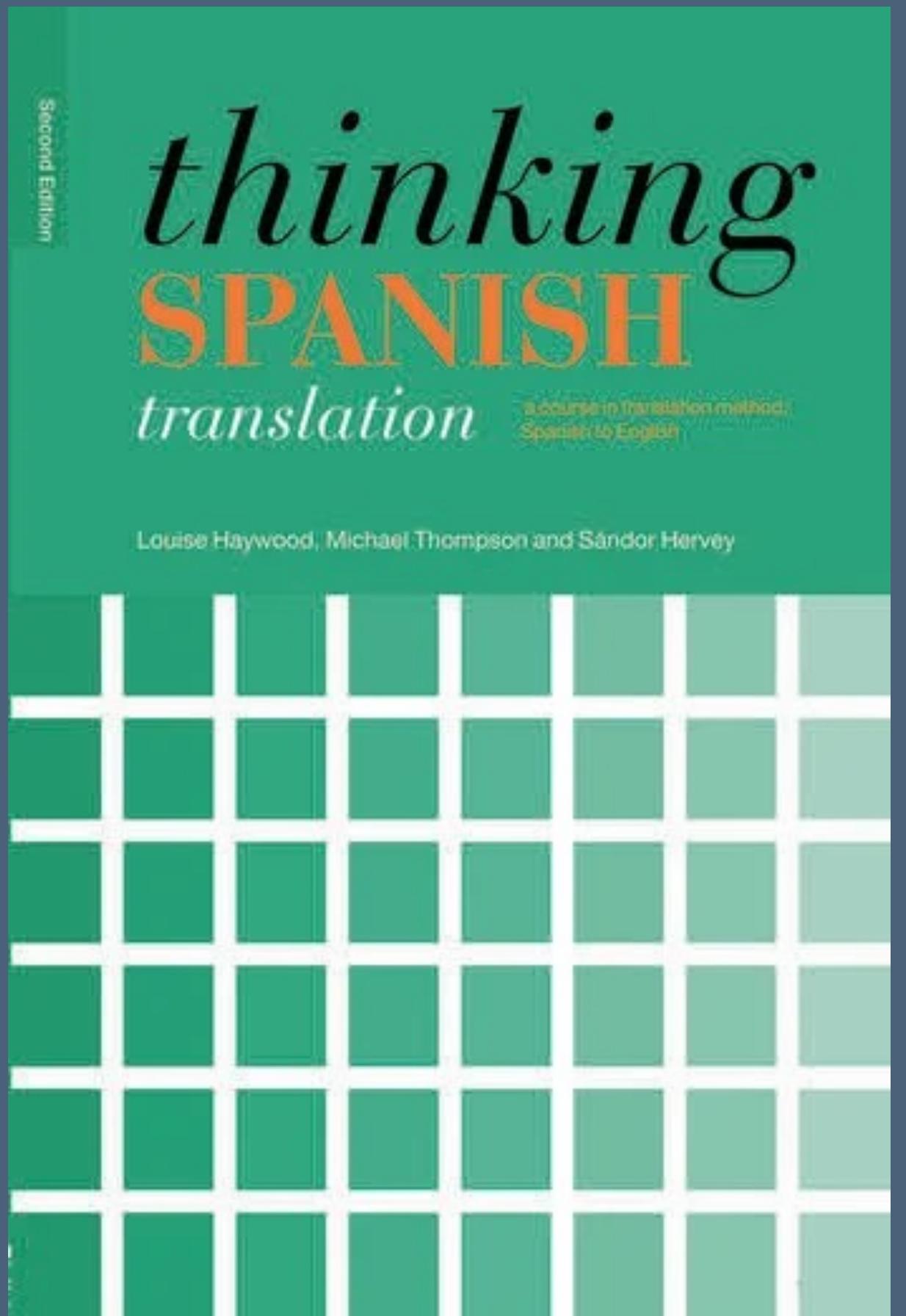
Wikipedia (28 entries) [edit](#)

arwiki	جبر على حقل
bgwiki	Алгебра над поле
cawiki	Àlgebra sobre un cos
cswiki	Algebra (struktura)
cvwiki	Алгебра (үй ڇييەن)
dewiki	Algebra über einem Körper
enwiki	Algebra over a field
eowiki	Algebro
eswiki	Álgebra sobre un cuerpo
fawiki	جبر روی یک میدان
frwiki	Algèbre sur un corps
glwiki	Álgebra sobre un corpo
iawiki	Algebra super un corpore
idwiki	Aljabar atas medan
itwiki	Algebra su campo
jawiki	体上の多元環
nlwiki	Algebra (structuur)
nnwiki	Algebra over ein kropp
plwiki	Algebra nad ciałem
ptwiki	Álgebra sobre um corpo
rowiki	Algebră peste un corp
ruwiki	Алгебра над полем
svwiki	Algebra över en kropp
ukwiki	Алгебра над полем
viwiki	Đại số trên một trường
zh_classicalwiki	代數 (代數)
zh_yuewiki	代數 (代數結構)
zhwiki	域上的代数

Translation methodology

Don't forget that translation is itself an entire field of study

- Scientific (or "technical") translation is a standard (choice) part in a course in translation – not as simple as "simply" being a bilingual domain expert
- There are good arguments that highlight how it is in fact just as "contextually subjective" as literary translation, but in different ways
- Highlighting the importance of the "pre-translation" work
 - Reduce duplication of effort
 - Make it possible to resolve detailed questions in a consistent manner
 - Good for building community standards ("style guide")



GitHub

Issues, pull requests, and builds

The image displays three side-by-side screenshots of the GitHub interface, illustrating the management of issues, pull requests, and continuous integration builds.

- Left Screenshot:** Shows the GitHub Issues page for the repository "ryankeleti / ega". A search bar at the top contains the query "is:issue state:open". Below it, a table lists eight open issues, each with a title, a link to the issue page, and the date it was opened. The issues are categorized by type: "A correction in EGA I, 7.4.3", "Dates in PDFs", "Site deploy", "numbering of sub-lemmas", "Fix \prime kerning", "equation references", "use katex for inline rendering", and "labels/numbering".
- Middle Screenshot:** Shows a Pull Request titled "EGA III, §2 #203" in the "ryankeleti / ega" repository. The pull request is in draft mode, merging four commits from the branch "3-2" into the "master" branch. The conversation tab shows a comment from "thosgood" dated Dec 7, 2022, stating "No description provided.". Other comments from "tim-at-topos" and "thosgood" are also visible.
- Right Screenshot:** Shows the GitHub Actions workflow file "main.yml" for the repository "ega / .github / workflows / main.yml". The workflow defines a "PDF release" job that pushes code to the "master" branch, runs on an Ubuntu latest container, and installs TinyTeX and LaTeX packages. It then builds PDFs using tlmgr. The workflow also includes steps for setting variables and uploading artifacts.

RMarkdown

```
1  ---
2  title: "Divisors in algebraic geometry"
3  author: "C.S. Seshadri"
4  date: "1958--59"
5  original: 'Seshadri, C. S. "Diviseurs en géométrie algébrique". _Séminaire Claude Chevalley_ 4 (1958-59), Talk no. 4. numdam.org/item/SCC_1958-1959_4__A4_0'
6  bibliography: SCC-4-4.bib
7  nocite: '@*'
8  link-citations: true
9  csl: maths-translations.csl
10 reference-section-title: "Bibliography"
11 github-repo: "thosgood/translations"
12 favicon: "favicon.ico"
13 ---
```

```
103 Let  $\mathcal{F}$  be a torsion-free coherent sheaf on a variety  $X$ .
104 Then the canonical homomorphism  $\mathcal{F} \rightarrow \mathcal{F} \otimes \mathcal{O} \otimes \mathcal{R}$  is injective.
105 The sheaves  $\mathcal{R}$  and  $\mathcal{F} \otimes \mathcal{O} \otimes \mathcal{R}$  are locally constant sheaves.
106 We can then identify  $\mathcal{F} \otimes \mathcal{O} \otimes \mathcal{R}$  with a vector space of finite dimension.
107 We call this dimension the *rank* of  $\mathcal{F}$ , and we can then consider  $\mathcal{F}$  as a
108  $\mathcal{O}$ -module.
109
110 :::{.itenv #proposition-4 title="Proposition 4" latex="{Proposition 4}"}
111 Under the same hypotheses as in [Proposition 3](#proposition-3), there exists a coherent
112 sheaf  $\mathcal{I}$  such that  $\mathcal{F} \otimes \mathcal{I}$  and  $\mathcal{F} / (\mathcal{I} \cap \mathcal{F})$  are torsion-free.
113 :::
114 :::{.proof}
115 The proof is immediate.
116 :::
117 :::
118 \oldpage{4-03}
119 If  $Y$  is a closed subset of an algebraic space  $X$ , then we denote by  $\mathcal{I}_Y$  the ideal sheaf
120 of  $Y$ .
121 :::{.itenv #proposition-5 title="Proposition 5" latex="{Proposition 5}"}
122 Let  $Y$  be a closed subset of an algebraic space  $X$ , and  $\mathcal{F}$  a coherent sheaf on  $X$ .
123 Then there exists an integer  $k$  such that  $\mathcal{I}_Y^k \mathcal{F} = 0$ .
124 :::
125 :::{.proof}
126 We can reduce to the case where  $X$  is affine, since there exists a finite cover of
127  $X$  by affine varieties.
128 In this case, the hypothesis implies that the set defined by the ideal  $\text{ann}(\mathcal{F}) \cap \mathcal{I}_Y^k = 0$ .
129 This implies, as is well known, that  $\text{ann}(\mathcal{F}) \subseteq \mathcal{I}_Y^k$ .
130 :::
131 :::
```

PDF (LaTeX)

HTML

The diagram illustrates the RMarkdown workflow. It starts with a YAML front matter block at the top left, which is processed into a LaTeX document (PDF) shown in a central box. This LaTeX document then serves as input for an HTML rendering, shown in a bottom box. Arrows indicate the flow from the YAML to the LaTeX, and from the LaTeX to the HTML.

1 Preliminaries

C.S. Seshadri
1958–59

Translator's note

This page is a translation into English of the following:

Seshadri, C. S. "Diviseurs en géométrie algébrique." *Séminaire Claude Chevalley* 4 (1958–59), Talk no. 4. numdam.org/item/SCC_1958-1959_4__A4_0

The translator (Tim Hosgood) takes full responsibility for any errors introduced, and claims no rights to any of the mathematical content herein.

Table of contents

Version: 9bcba86

Divisors in algebraic geometry

C.S. Seshadri 1958–59

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In the first part, we will prove a theorem of Serre on complete varieties [6], following the methods of Grothendieck [4]. The second part is dedicated to generalities on divisors. In the literature, we often call the divisors studied here “locally principal” divisors.

The algebraic spaces considered here are defined over an algebraically closed field K . By “variety,” we mean an irreducible algebraic space. If X is an algebraic space, we denote by $\mathcal{O}(X)$, $\mathcal{R}(X)$, etc. (or simply \mathcal{O} , \mathcal{R} , etc.) the structure sheaf, of regular functions, etc. on X (to define $\mathcal{R}(X)$ we assume that X is a variety). By “coherent sheaf” on X , we mean a coherent sheaf of \mathcal{O} -modules on X .

1 Preliminaries

References: [4–6]

If M is a module over a ring A , then we say that an element $m \in M$ is a torsion element if there exists a non-zero element $a \in A$ such that $am = 0$. The submodule generated by all torsion elements is called the torsion submodule of M , denoted by $\text{tors}(M)$.

2 Dévissage theorem

3 Divisors (Generalities)

Bibliography

Divisors in algebraic geometry

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Version: 9bcba86

1 Preliminaries

References: [4–6]

If M is a module over an integral ring A (commutative and with 1), then we say that an element $m \in M$ is a torsion element if there exists a non-zero element $a \in A$ such that $am = 0$. The submodule generated by all torsion elements is called the torsion submodule of M , denoted by $\text{tors}(M)$.

2 Dévissage theorem

3 Divisors (Generalities)

Bibliography

Russian for the Mathematician

The only book of its kind?

- "The Board of Trustees of the American Mathematical Society, expressing its belief that a great deal of time would be saved for mathematicians if they could study a textbook of Russian precisely adapted to their needs, granted to the present author nine months leave of absence from his duties as Editor of Translations."

S. H. GOULD

RUSSIAN FOR THE MATHEMATICIAN



SPRINGER-VERLAG BERLIN · HEIDELBERG · NEW YORK

4. Difficulties

Technical terminology

Things can get oh-so specific

- Sometimes a native speaker (or good standard dictionary) could suffice
 - ... but sometimes you need them to be a mathematician
- ... in the specific domain
- ... from a specific period of time
 - Example: "trace" — not even anywhere on any relevant French Wikipedia page... apart from the actual page
 - (Also sometimes there are just typos, mistakes, or even mildly (forgivably) sloppy writing)

\mathcal{J}_1 et \mathcal{J}_2 tels que $\mathcal{J}_1 \cap \mathcal{J}_2 = \emptyset$, et que $\cup_{i=1}^n \mathcal{J}_i = \mathcal{J}$. Soit $Z = \mathbb{A}^n$ le sous-préschéma de X sup de X_1 et X_2 est X , tandis que leur $\inf Z$ est plat sur X). Supposons de plus que, pour tout $s \in S$, les $\text{Hom}_{k(s)}(H^0(X_{1s}, \mathcal{O}_{X_{1s}}),$
 $i = 1, 2, \text{ soient bijectifs. Alors l'homomorphisme naturel de foncteurs}$
 $\text{Pic}_{X/S} \rightarrow \text{Pic}_{X_1/S} \times \text{Pic}_{X_2/S}$

Technical terminology

Bingener, J. "Über formale komplexe Räume"

In der vorliegenden Arbeit soll nun zunächst die Grundtheorie der formalen komplexen Räume entwickelt werden. Letztere werden in 1 als induktive Limiten eines geeigneten Systems von komplexen Räumen eingeführt. Spezielle formale komplexe Räume erhält man, wenn man die formalen Kompletierungen komplexer Räume längs analytischer Teilmengen betrachtet. Natürlich ist auch jeder komplexe Raum ein formaler komplexer Raum. Die Strukturgarbe \mathcal{O}_X eines formalen komplexen Raumes X ist stets kohärent mit lokalen noetherischen Halmringen ((1.1) und (1.4)). Es ist von Bedeutung zu wissen, daß wie bei den komplexen Räumen die Schnittringe Steinscher Kompakta in X ausgezeichnete noethersche Ringe sind ((1.4), (1.10)). Formale komplexe Räume lassen sich (lokal) in Zahlenräume einbetten, vgl. (1.7).

In the present article, we first develop the basic theory of formal complex spaces. These are introduced in §1 as inductive limits of a suitable system of complex spaces. We obtain special formal complex spaces if we consider the formal completions of complex spaces along analytical subsets. Of course, every complex space is also a formal complex space. The structure sheaf \mathcal{O}_X of a formal complex space X is always coherent with local Noetherian stalks ((1.1) and (1.4)). It is important to know that, as in the case of complex spaces, the !!TO-DO: intersection rings?? of compact Stein subsets of X are excellent Noetherian rings ((1.4) and (1.10)). Formal complex spaces can be (locally) embedded into !!TO-DO: number spaces??, cf. (1.7).

Anachronistic translation

Where does translation end and commentary begin?

Anachronistic translation

Where does translation end and commentary begin?

- Terminology changes over time, in many ways
 - "good", "satisfying Axiom B", "of Grothendieck [G1967a]" ➡ ?
 - Do we translate "literally", or so that the modern reader will know what it means? Footnote it?

Anachronistic translation

Where does translation end and commentary begin?

- Terminology changes over time, in many ways
 - "good", "satisfying Axiom B", "of Grothendieck [G1967a]" $\Rightarrow ?$
 - Do we translate "literally", or so that the modern reader will know what it means? Footnote it?
- Different choices are made at different times by different groups
 - In double categories: vertical/horizontal vs. horizontal/vertical vs. taut/loose vs. tight/loose vs. arrow/pro-arrow vs. weft/warp
 - "tribu" vs " σ -algèbre"
 - ... why did the author make their specific choice?

Ambiguity inherent to English

Or: different languages do different things in different ways

- Sometimes a word-for-word translation will be much more ambiguous in English than in French/German/any language with grammatical gender/case/any accordances (e.g. plurality of adjectives)
- Certain "grammatically correct" constructions in English can sound overly formal:

Ambiguity inherent to English

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- Certain "grammatically correct" constructions in English can sound overly formal:

In order for X to satisfy Y

that Z satisfy W

For X to satisfy Y

it is necessary and sufficient

that Z satisfies W

To have that X satisfying Y

for Z to satisfy W

[it is necessary and sufficient for Z to satisfy W for X to satisfy Y] ?!

Editorial consistency

Community submissions and community vibes

- How do we make it sound like a community translation glosses nicely as if written by a single author?
 - (Bonus question: do we always want this?)
 - Style guides help, but ...
 - ... hard to write, and even harder to write well
 - ... don't solve all problems (even in a monolingual environment!)
- How much effort should be asked of contributors?
 - "I ran this chapter through Google Translate"
 - Balancing useful contributions with unnecessary gatekeeping
- What counts as a contribution?

5. Future resources

Improved maths dictionary

Enabling community

- More utility as a single-language dictionary
 - Pluralisation, cases, ... ???
 - Common phrases ("let X be a Y", "if A then B", "it is necessary and sufficient that")
 - Example sentences from actual papers, placing words into context
- Better usability as software
 - Allow people to make suggestions, comments, corrections
 - Export vocab lists for specific language pairs (and specific topics?)
- Really figure out how to make it "open by design"

Weblate

Translation for software ... for mathematics?

The screenshot shows the Weblate interface for translating strings from English to Czech. The top navigation bar includes links for Weblate, Dashboard, Projects, Languages, and Checks. The main area displays a list of strings:

- Singular:** %(count)s word
- Plural:** %(count)s words
- Czech, One:** %(count)s slovo
- Czech, Few:** %(count)s slova
- Czech, Other:** %(count)s slov
- Plural.formula:** (n==1)? 0 : (n>=2 && n<=4) ? 1 : 2

Below the strings are buttons for "Needs editing" (unchecked), "Save and continue", "Save and stay", "Suggest", and "Skip". A status bar at the bottom right indicates "translated 96%". On the right side, there is a sidebar with sections for "Glossary", "String information", "Explanation", "Labels", "Flags", and "Source string location".

The screenshot shows the Weblate interface for managing comments. The top navigation bar includes links for Nearby strings, Comments (selected), Automatic suggestions, and Other languages. The main area shows a "New comment" form:

New comment
Comment on this string for fellow translators and developers to read.

Scope
Translation comment, discussions with other translators

Is your comment specific to this translation or generic for all of them?

New comment
You can use Markdown and mention users by @username.

Save

On the right, a sidebar lists recent activity:

- weblate/templates/translation.html:149
- String age 7 seconds ago
- Source string age 7 seconds ago
- Translation file weblate/locale/cs/LC_MESSAGES/django.po, string 5

At the bottom, there is a footer with links: Powered by Weblate 4.10, About Weblate, Legal, Contact, Documentation, and Donate to Weblate.

Languages for the Mathematician

Tailored introductions to languages

- Highly specific: I can't go to the cinema last weekend with my friends, but I can take a left Kan extension along an acyclic cofibration of delta lenses
- Start with useful building-block phrases ("let X be a Y ", "if A then B ", etc.) and general vocabulary (definition/Theorem/proof)
- Vocabulary lists for specific domains
- Examples from actual papers
- What would a term-long course based on this look like?
 - Masters theses?

Expository articles and blog posts

Again: translation over universality

- General expository articles (AMS "What is...") in non-English languages
 - Help people with translations in both directions
 - Push back against domain collapse
 - Build communities around translation, indirectly
 - Highlight language-specific references
 - We "know" what these might be for the most common languages (German complex geometry, French category theory, Italian geometry), but are still missing key parts, and ...
 - ... what about all the things we don't know? What mathematics is happening in Basque? in Farsi?

GitHub templates

Reducing technological cost of entry

- Somebody wants to create a community around a new translation project? "One click" setup for it all:
 - Repository
 - Issues
 - Discussions
 - Builds
 - Contributor lists

Workshops and conferences

Like this one!

- I was so excited to get an invite!
- Building on top of "mere" translation and into commentary/exposition/historical contextualisation is seen as core in other domains, so why not in mathematics?
 - Creating legitimacy and "prestige" is hard, but events and community building is not a bad way to start
- Good excuse to bring together TL and SL researchers
 - Run the translation parts in tandem with standard research talks
 - Long-term dream: more multi-lingual journals

Thanks!