Czech Society for History of Science and Technology (SDVT) and
Czech Mathematical Union (JČMF)

cordially invite you to an interdisciplinary workshop

Mathematics and Language
A Historical Perspective (II)

Preliminary programme

Thursday 4 June 2026

10:30–11:00	Welcome coffee
11:00–12:30	Invited lecture: **Kateřina Trlifajová** (Czech Technical University, Prague) Abstraction and Idealization: from Natural Language to Mathematical Structures
12:30	lunch
14:00–14:45	**Adéla Velátová** (Masaryk University, Brno) Editing Mathematics as Language: Towards a Textual Criticism of Mathematical Symbolism
14:45–15:30	**Karolína Švandová** (Charles University / Czech University of Life Sciences Prague) Calculating on the Edge: Material Practices of Arabic Mathematical Writing in the Manuscripts of al-Qalṣādī (d. 1486)
15:30	coffee
16:00–17:30	Invited lecture: **Amirouche Moktefi** (Tallinn) The shaping of logic languages
19:30	joint dinner

Friday 5 June 2026

9:00–9:45	**Jan Kotůlek** (VSB–TU Ostrava) Two Languages of Calculus: Between Pure Mathematics and Engineering Practice
9:45	coffee
10:15–11:00	**Davide Crippa** (Czech Academy of Sciences, Prague) Translating Euclid for the modern public: the challenge of Claude Milliet Dechales
11:00–11:45	**Helena Durnová** (Masaryk University, Brno) The exactness of the language of mathematics as a style to be imitated
11:45	closing remarks and lunch

Abstracts

Invited papers

Kateřina Trlifajová (Czech Technical Unviersity, Prague)

Abstraction and Idealization: from Natural Language to Mathematical Structures

During the 20th century, following the introduction of set theory, the concept of the truth of mathematical statements changed. Mathematical theories came to be understood as systems grounded on a well-defined set of axioms, and (relatively) true theorems as logical consequences derived from these axioms. The notion of truth as a correspondence between the real world and its mathematical description has been disregarded, particularly in the case of mathematical statements concerning infinity. The processes of abstraction and idealization play an important role in establishing such a correspondence. This is why they have received increasing attention in recent years in academic research.

In this talk, I will clarify how abstraction and idealization are understood in the sciences and highlight their difference. I will present examples from the domains of language and rational statements, geometry, physics, and others. Although idealization has produced remarkable results, it is not always unambiguously defined, nor has it always been accepted. I will finally focus on the original way Petr Vopěnka abstracts phenomena from the real world that are associated with vagueness, and how he idealizes them using infinity. This leads to a nonstandard model which, in contrast to other models, refers to its correspondence with the real world.

Amirouche Moktefi (Tallinn University of Technology, Estonia)
The shaping of logic languages

It is well known that logic went through significant transformations in the nineteenth century that led to the shaping of what is sometimes called modern or mathematical logic. The main feature of this new logic is its mathematical form. Among the logicians who contributed to this development, some names are well remembered, notably George Boole, Gottlob Frege, Giuseppe Peano and Charles S. Peirce. However, a multitude of other logicians, mostly forgotten today, have proposed rival languages, both symbolic and diagrammatic, to express logical entities and propositions. This plurality led to a friendly, albeit fierce, competition between logicians in their quest for better notations to tackle logical problems. For the purpose, logicians commonly compared their solutions in print. In this setting, some logicians drafted tentative guidelines for the design of new notations. Others called for a "slight social repression" against new proposals. This talk aims at unfolding this dispute. It addresses the ideals that guided the competition between rival notations and, eventually, the shaping and adoption of modern logic languages.

Contributed papers

Davide Crippa (Czech Academy of Science, Prague)
Translating Euclid for the Modern Public: the Challenge of Claude Milliet Dechales

In seventeenth century Europe, mathematical publications increasingly addressed a non-academic readership characterized by varied educational backgrounds and linguistic competencies. As Latin gradually lost its monopoly over scientific discourse, vernacular textbooks multiplied and circulated more widely. A revealing case is provided by the many shortened and adapted versions of Euclid's Elements, long regarded as a paradigmatic mathematical textbook for rigorous and logical reasoning.
In this short presentation,I will focus on the compendia of Euclid's Elements prepared by the Jesuit mathematician Claude François Milliet Dechales (1621-1678). My study of Dechales was also inspired by personal circumstances, as I came across an annotated copy of a French edition of "Les Elements d'Euclide, expliqués d'une manieere nouvelle et tres facile. Avelc l'usage de chaque Proposition pour toutes les parties des Mathematiques", 1690, which is now hosted at the Library of the Institute of Philosophy of the Czech Academy of Sciences.
Dechales was a professor of mathematics in Lyon (1659-1660) and at the college in Marseille (1669-1670). Especially in Marseille he faced the challenge of teaching mathematics to future pilots, with limited knowledge ofelementary mathematics and Latin. In response, he produced several abridged versions of Euclid Elements both in Latin and French. The axiomatic-deductive structure of the Elements, celebrated by philosophers as a model of rigorous reasoning, could appear inaccessible to practitioners seeking practical competence rather than formal demonstration. Dechales explicitly

addressed this tension: his aim was not to contribute new discoveries, but to reorganize established knowledge in a way that was better suited to a broader audience.
Translating from Latin into French was just one step toward achieving this goal. Dechales also did not hesitate to transform the content, recasting abstract propositions in relation to concrete applications such as surveying, astronomy, and navigation, and eliminating entire books, such as Euclid's arithmetical ones.

The general goal behind this talk is to use Dechales's work on Euclid's Elements as an invitation to reconsider the role of translation in the history of mathematics. Translation is not only a neutral transfer between languages, but also an epistemic operation that reshapes both content and authority. The success of Dechales' compendia, which were republished after his death with contributions of the French mathematician Jacques Ozanam, indicates that the demand to translate and adapt classical sources into user-friendly and application-oriented mathematical texts was a structural feature of the early modern expansion of mathematical knowledge to a new public.

Helena Durnová (Masaryk University, Brno)

The exactness of the language of mathematics as a style to be imitated

Mathematics has a special place in today's education and has a distinctive place in shaping the intellectual comunity, as the ability to solve problems from mathematics textbooks has become a key component of in deciding about the intellectual capacity of children. The development has not happened overnight and has its roots in honest efforts to bring all the sciences to the same level of certainty as mathematics: since the 19th century, researchers have been trying to imitate the mathematical method, since they have seen it work wonders in physics. In the Czech context, the new method was promoted by Tomáš Garrigue Masaryk in his inaugural lecture Probability calculus and Hume's skepticism (1882), where he also envisaged the rise of a new kind of logic: a logic based not on causality, but on probability, stemming from observations. In the 20th century, positive market value of mathematical abilities and mathematical thinking rose also in connection with the development of computers. What remained in the background, though, was the specification of what mathematics is; and once mathematics became a school subject, it is commonplace to equate mathematics with calculations and numbers in general. In my talk, I will focus on the metaphors associated with mathematics, such as algorithm and algebra, and their role in shaping the way we communicate with computers in the postwar decades.

Jan Kotůlek (VSB–Technical University of Ostrava)

Two Languages of Calculus: Between Pure Mathematics and Engineering Practice

The Industrial Revolution of the nineteenth century reshaped not only economies but also the audiences and purposes of mathematics. As engineering and industrial production expanded, mathematics increasingly spoke to a new constituency of practically oriented experts whose needs differed markedly from those of the traditional scholarly elite. These actors became key drivers in the expansion of technical education and in the demand for teaching materials oriented toward application rather than abstraction. In this context, mathematics gradually lost its exclusive status as the “queen of sciences” and came to be valued as an indispensable tool for controlling industrial processes and enabling economic growth.

This transformation was particularly visible in the Czech lands, the most industrialized region of the Habsburg Monarchy. There, rapid industrial development went hand in hand with the emergence of technical education in the Czech language. The late 1860s saw the publication of the first Czech-language textbooks of higher mathematics by Gustav Skřivan and František Josef Studnička, written primarily for students at the Prague Polytechnic. These early works marked an important step in making advanced mathematical knowledge accessible to a new, linguistically and socially distinct audience.

By the turn of the twentieth century, however, these pioneering efforts appeared increasingly outdated. The rapid advancement of applied mathematics in Western Europe exposed a growing gap that Czech authors struggled to close. Eduard Weyr’s calculus textbook for the university students, published in 1902, was widely perceived as a long-awaited attempt to address this lag. Yet its reception revealed a sharp generational divide, pitting younger critics against established authorities within the mathematical community. The sharply critical review by the young J. V. Pexider not only challenged the book’s scholarly merits but also triggered a broader controversy that strained personal and professional relationships among Czech mathematicians.

In the following decades, several authors sought to redefine how mathematics should be taught to engineers. Textbooks by František Čuřík (1915), Jan Vojtěch (1916), and František Rádl (1931) represented distinct attempts to balance theoretical foundations with practical demands. Their reception again underscored a persistent divide, however on other level: while university mathematicians criticized issues of rigor, structure, and clarity, engineers valued these works for their emphasis on applicability and usability in technical practice.

The debates surrounding these textbooks illuminate a deeper and enduring tension within modern mathematics: the uneasy relationship between theoretical rigor and practical utility. Far from being a marginal or short-lived dispute, this conflict has continued to shape the teaching and understanding of mathematics well into the present day, reflecting broader questions about the role of scientific knowledge in an industrial and technological society.

Karolína Švandová (Charles University / Czech University of Life Sciences Prague)

Calculating on the Edge: Material Practices of Arabic Mathematical Writing in the Manuscripts of al-Qalṣādī

Abū al-Ḥasan ʿAlī al-Qalṣādī (1412, Granada – 1486, Tunisia), one of the most significant mathematicians of the late medieval Islamic world, is traditionally remembered for his contributions to algebraic notation. While existing scholarship has long studied his work through the lens of terminology and symbolic development, my research shifts the focus toward the physicality and functional use of his mathematical practice. By examining al-Qalṣādī's holographs (manuscripts written entirely in the author's own hand) produced during his life and travels in Andalusia and North Africa, we gain a unique window into how mathematical knowledge was formulated and structured.

Drawing on ongoing doctoral research focused on al-Qalṣādī's works in arithmetic and Islamic inheritance law, this paper focuses on how these mathematical practices were organized within the constraints of the traditional Arabic manuscript; such as layout, tabular structures, marginal additions, and paratextual framing. It analyses the relationship between the dense, linear prose of the main text and the visual logic of tables used for the divisions of inheritance shares (the rules governing the distribution of inheritance in Islamic law), which function as integrated computational tools. These elements transform the page from a passive record into an active mathematical workspace, offering a close case study into a specific yet underexplored corner of the Arabic mathematical manuscript tradition.

Beyond the initial composition, these holographs offer a rare insight into al-Qalṣādī's own working and teaching methods: his marginal additions and elaborations, such as providing alternative computational techniques, demonstrate a continuous process of refining mathematical ideas even after the main text was completed. The study further considers the reception of these texts within the specific context of the Islamic world, where manuscripts traditionally circulated as shared tools between teachers and students. By analyzing the (often minimal) annotations left by later users, it is possible to reconstruct how these works were transmitted across generations of readers.

Ultimately, this study argues that to understand "mathematics practised in Arabic" in a more holistic way, we must look beyond vocabulary and treat the manuscript page as an integrated linguistic and material artifact. In this perspective, the layout of the page, including tabular structures, spatial organization, and the interplay between linear prose and diagrammatic elements, functions as a form of non-verbal mathematical language

Adéla Velátová (Masaryk University, Brno)

Editing Mathematics as Language: Towards a Textual Criticism of Mathematical Symbolism

If mathematics is treated as a language in its own right, then philological methods should not be neglected when working with mathematical texts. This applies in particular to historical sources, which must be made accessible to readers through carefully defined editorial interventions. In the case of verbal language, such work is the domain of textual criticism, which uses explicit, transparent rules to edit manuscripts and early prints so that the text becomes readable without altering its meaning. Yet in mathematical writings, the question remains: how is the mathematics itself – the notation, formulae and symbolic structures – actually edited, and is it possible to subject mathematics to the same kind of critical editing as its surrounding prose?

Building on recent large-scale editions of early modern mathematics, such as the Leibniz-Edition and The Newton Project, the presentation first shows how existing projects oscillate between conservative, presentationoriented transcription of formulae and cautious semantic normalisation. Using tools from predicate logic, it then proposes a principled distinction between logical and nonlogical symbols as a basis for formulating editing rules that parallel established practices in textual criticism. Some mathematical symbols and punctuation, for example, can often be modernised without semantic loss, whereas other parts of the notation call for greater editorial caution. The presentation explores how mathematical expressions can be typeset in ways that avoid shifting their original meaning while still making the notation legible and as accessible as possible for present-day readers.

On this foundation, it develops criteria for when mathematical notation should be merely transliterated and when it may be transcribed into modern symbolism without altering the meaning of terms or formulae. These criteria are tested against concrete cases from major editions and from the work of Brook Taylor, illustrating how editorial decisions about symbols shape the accessibility, searchability and interpretability of mathematical sources. The broader aim is to argue that, just as textual criticism seeks to make historical text legible without erasing its philological layers, a theory-driven approach to editing mathematical symbolism can localise and stabilise meaning without normalising early modern mathematics into the language of contemporary practice.

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