

Mathematics as an experience in internationalism

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Mathematical geography

- Most mathematicians,
as most scholars from other domains,
discover many other countries on the occasion of
 - conferences,
 - invited lectures or talks,
 - private invitations by foreign colleagues
who have become friends.
- Some countries where I have made
several visits of at least one month:
 - India,
 - Russia,
 - Italy,
 - China,
 - Japan.

Remark:

I just realize that each of my most visited countries
is a bright civilization in itself
with a very long history.

Sharing mathematics and beyond

- Mathematicians from all over the world create relations on the basis of the mathematics they share.
 - Mathematicians may have a hard time understanding each other but this is because of specialization.
 - For them, it is much easier to understand foreign mathematicians working in the same domains than mathematicians from the same country working in other domains.
- Relations between mathematicians are created on the basis of shared mathematics but they often go well beyond.
Friendships are created and elements of culture gradually go through.

My experience:

Many things can be built on the basis of a common orientation to looking for elements of truth:
“Human beings are creatures who seek the truth.”

Some teachings from visits in foreign countries and relations with foreign people

1) First and foremost, learning new elements of mathematics:

- Along history, even recent history, have existed distinct schools of mathematics (ex: French, German, Russian or Soviet, British, Polish, Japanese, Italian, American, . . .) which practiced mathematics not exactly in the same ways.
- This seems related to the fact that each such school has practiced mathematics in its own language: each human language is a particular way of thinking.
- Mathematics is more rich if it is practiced and developed in different languages.
- Nowadays, automatic translation systems make it possible to combine diversity of languages and communication.
- Chinese is very different from European languages. It can inspire a distinct way to develop mathematics.

Some teachings from visits and relations with foreigners

2) The realization of the natural unity of the human family:

- Foreign people, including from very distant countries, are not very different.
- We all can have the same feelings and share similar abilities.
- Even if the languages can seem completely different, the existence of translations shows that the conveyed meanings are extremely similar.
- Differences between individuals from the same country often seem bigger than differences between cultures.

Do I feel as a foreigner in China?

- Yes as the language is completely different and even more as I find myself illiterate in China, surrounded by expressions of abstract art called "Chinese characters".
- Not really if I think about the Chinese people I know, especially mathematicians, with whom communication and understanding seems to me no more difficult than with other French people.

A puzzling question

How is it that, for the French mathematician I am,
China looks “less different”
than, in particular, India or Japan?

→ One can look for explanations in recent history
but also for long term constants:

China as a neighbor:

- Central Asian nomadic populations, especially the Mongols,
have played a most important role
in the history of China, in the history of Russia
(particularly as invaders who eventually became Chinese or Russian)
and beyond:
it is believed that an important part of European populations
had migrated from Central Asia.
- One of China's most important neighbors and friends
is Russia
whose language, culture, civilization and spirit are European
and which is no less a key component of Europe
than France, Germany or England
(not mentioning Greece, Rome, and Jerusalem which are for us the sources).

Some teachings from visits and relations with foreigners

3) Virtues which we easily understand and value
but which are presently better practiced by some foreigners:

It is easy to list virtues which are valued
both in the classical European tradition and Chinese tradition
but which are presently better practiced by many Chinese people:

- Courage to think that difficulties can be overcome
by hard work, collective effort, dedication and wisdom.
- Hard work.
- Recognition of the importance of education and knowledge.
- Hospitality.
- Humility.

4) Subtle differences of thought:

- Confrontation between French or European thought and Chinese thought
may help us realize that more possibilities are open.
- For instance, François Julien, a French philosopher and Chinese studies scholar
has written many books to make explicit differences of thought:

→ Example: Strategic thinking

He says that European strategies are goal-oriented
while Chinese strategies aim to modify environments.

Infinite international indebtedness

Not only mathematicians
know and value the work of other mathematicians from many countries
but their own whole work
is based on the previous work of others.

My own infinite debts:

- Alexandre Grothendieck, the most extraordinary representant of the French School, who was originally half German and half Russian.
- My former PhD advisor, French mathematician Gérard Laumon.
- Canadian mathematician Robert Langlands.
- Ukrainian Russian-speaking mathematician Vladimir Drinfeld, who became one of the brightest members of the legendary Moscow School.
- Italian mathematician Olivia Caramello, who is continuing the work of Grothendieck on “toposes”.

Infinite sequences of debts:

- The genius work of Grothendieck is based in particular on the “theory of categories” introduced earlier by Samuel Eilenberg (from Poland) and Saunders MacLane (from USA).
- The first groundbreaking work of Grothendieck in “algebraic geometry” makes essential use of “characteristic classes” introduced by Chern Shiing-Shen . . .

“The past is another country”

- The foreign country to which mathematicians are most indebted is just the past.
- Mathematics is a human tradition which has been transmitted and cultivated already for several thousand years.
- Any new generation builds on the work of previous generations, not only recent generations but generations of centuries and millenia ago.
- For mathematicians, the past is present and the history of mathematics is part of mathematics, as testified by the use of names of mathematicians to designate mathematical concepts or results:
 - “Pythagorean theorem”, “Thales’ theorem”, “Chinese reminder theorem”,
 - “Euclidean space”, “Cartesian coordinates” (Descartes), “Fermat’s descent”,
 - “Newton’s method”, “Leibniz’ rule”, “Lagrangian”, “Euler-Arnold equation”,
 - “Gauss sums”, “Gaussian distributions”, “Galois theory”, “Lobachevsky space”,
 - “Riemann surface”, “Euler-Poincaré formula”, “Poincaré group”,
 - “Markov chain”, “Hilbert space”, “Banach space”, “Chern classes”, ...

The blessing of infinite indebtedness

- Mathematicians cannot ignore their infinite indebtedness to other mathematicians, other countries and cultures, previous generations, past centuries and millenia.
- As a French mathematician, I cannot forget that European nations, that fought each other for centuries, are also infinitely indebted one to the other.
- As a “Western” mathematician (a qualification I find partly misleading) I cannot forget that France and other “Western” countries owe infinite intellectual, cultural and even historical debt to Russia, the former Soviet Union, including of course Ukraine, and “Eastern” nations, cultures and civilizations.