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THE LANGUAGE OF SCIENTIFIC TEACHING AND WRITING IN SMALL EUROPEAN COUNTRIES

Professor Jussi-Pekka Taavitsainen has asked me - a Finnish biologist - to comment on Professor Valter Lang's interesting article Archaeology and language. Lang studies the languages used by archaeologists in different countries, by investigating the languages of the papers referred to in archaeological journals and books. One of the main conclusions we can draw from the diagrams presented by Lang is that "the greater the nation, the higher the proportion of native language publications and the smaller the number of languages used (and vice versa)". The diagrams are indeed striking and shocking; unfortunately I know of no exactly corresponding study of biological publications. For local and ecologically oriented biology the tendencies are probably similar, although in biology the dominance of English is probably even stronger, independent of the country of the scientists studied.

Archaeology and ecological biology have at least two features in common: firstly both fields have a position between the exact natural sciences and more descriptive fields of study; secondly both fields benefit from a close cooperation with amateurs. Our daily work benefits from observations made by enthusiastic amateurs all over the country, and thus all of us understand the importance of (popular) science published in native languages. On the other hand it is clear, at least for everyone in biology, that our main job is to contribute to the international discussion of our field, and thus important results have to be published in English. All these points are well presented by Professor Lang, and here I will limit myself to two more specific questions:

1) What is the role of national languages in university teaching?
2) What do we gain from a multilingual academic milieu?

Professor Lang has a good point connected to the risks with making English (or German) a universally prevailing academic language: "If we do not write about the results of our studies in the language we speak, its scientific terminology will inevitably degenerate and, before long, we will be simply unable to think scientifically in our mother tongue". Personally I am very sceptical when some people in Sweden and Finland try to transform our main universities into international institutions with teaching in English. It is understandable that they like to transform some Scandinavian universities into European intellectual centres, but I think they overestimate the language skills of the students (who often do not even master their mother tongue very well), and further I think that they underestimate the complexity and sophistication of language as such.

One cannot separate the ability to understand, speak and write a language from the ability to think, and to master a complex logical apparatus. These abilities are all aspects of one and the same mental competence. And we cannot transfer this competence overnight from one language to another. "In the best of all worlds" every student should get the opportunity to become acquainted with the main concepts of his/her field of study

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using his/her mother tongue. After that s/he is ready to formulate insights in a foreign language.

In the field of biology, getting a master's degree means that you learn to understand and to use about one thousand biological concepts. Learning the adequate terms in English is not difficult. Usually the terms are not very different in different European languages. A hard-working student could learn them in two months. But for really understanding the concepts, and for understanding how they are connected in the complex network we call biology, one certainly needs four or five years.

Of course a large part of this process takes place in English, as most textbooks are in English, but personally I think it is important that every student gets a chance to discuss particularly difficult concepts in his or her mother tongue. When a student too suddenly jumps into a completely English academic world he starts to use terms which he does not fully understand. Of course all of us use terms and words we do not fully understand, but the difference between a person with an academic degree and a lay person should be that the person with the degree is able to use the terms (within his narrow field) with a relatively high degree of understanding. Understanding also means an ability to relate the academic concepts to the everyday world around us, and this everyday life is one that we live using our mother tongue.

And here we finally come to the importance of people who write science and popular science in minority languages, and the importance of an ongoing high-level academic discussion in all cultural languages. New scientific ideas are born when the accepted academic curriculum collides with other lines of thought. It is thus of crucial importance - both for our research and for our national cultures - that we do not isolate our scientific activities in a closed English-speaking sphere. This sphere easily becomes intellectually sterile precisely because English is not our mother tongue. My experience is that no fruitful brainstorming occurs in a group if most of us have to concentrate on how to say things in correct English instead of concentrating on what to say.

My second question concerns the possible role of a multilingual academic milieu. Does a multilingual academic world have any creative potential *per se*? Wouldn't everything be much easier and more efficient with just English as a common universal academic tongue? There are already a lot of people today who in reality live in such a monolingual world, as indicated for instance by Professor Lang's diagram showing the language environment of British archaeology. By not reading other languages these scholars are efficiently isolated from a wide world of knowledge; especially, I guess, from most of the archaeology published before 1940. The situation is very similar in biology; many British and American biologists simply do not read German. We should not, of course, underestimate the work connected with learning several foreign languages. It is clear that for some people it is simply not worth the enormous effort.

Above I have stressed the importance of collisions between narrow academic circles and surrounding intellectual activities. The same reasoning applies to encounters between different research traditions. This may occur without breaking language barriers, but often the most fruitful encounters occur between different traditions represented by different language groups. The excellent American physics and biology of last century was for instance to a large extent created by Jews from Germany, Austria, Hungary and Italy, and later by people from Eastern Asia. Today we have successful Russian scientists all over the world. Although it is difficult to prove I think that a part of the creativity demonstrated by these immigrants is the result of fruitful cultural encounters.

The importance of cultural encounters is related to the importance of "general education". Let me take just one example: during the past decades we have experienced a lively discussion on human evolution, both biological ("Darwinian") evolution and cultural evolution, and the interaction between them. This discussion has been somewhat different in the USA, England, Russia (Soviet Union), France, Germany and Japan. My impression is that a scholar who tries to understand the cultural background of these differences must be able to read texts in most of these languages.

Unfortunately, general education encompassing many foreign languages is rare today. With some envy I recently noticed that Odo Morannal Reuter (1850-1913), who was a brother of my grandfather, and who like me was Professor of Zoology at the University of Helsinki, published his main scientific articles in Latin, French, German, English and Swedish, and further wrote a

number of minor papers in Finnish, Russian, Hungarian, Danish and Italian. He was an entomologist, and at that time each European country had its own societies and journals, each publishing in their native languages, and often also in Latin, French or German. The English language is our new Latin, and I think it is good for us to have one language of universal distribution. At the same time it is important that we are able to discuss difficult theoretical matters in our national languages, and of course it is very useful to be able to read texts written in French, German and Russian.