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The contribution of the Greek language to the formation of international scientific terminology

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We first examine what is considered to be Greek. That is to say we refer to the various situations of borrowing Greek by European languages, and pay particular attention to lexical units (l.u.) that the European languages have borrowed from Greek whether directly (direct borrowing from Greek) or through Latin (direct borrowing from Latin), as well as the l.u. that European languages have constructed using elements from AG. Next we follow this by focusing on the fact that borrowing mainly concerns academic and scientific lexis/terms as opposed to everyday, general lexis. The third part of our work examines the types of influences undergone by European languages through adoption from AG, whether an influence be in the form of AG combining forms, prefixes, suffixes e.g. AG μικρο- > *micro-* (≠ *macro-, méga(lo)-*), ἀντι- > *anti-,* -ικός > *-ic,* or formed from the use of Term Formation Rules. Finally we pose the question of why destiny has reserved such a destination for the Greek language.

In 1957, in his role of Greek representative, Xenofon Zolotas made a speech to the IMF which tweaked international interest because, while his text was in English, the terms in it all came from Greek.

During the Renaissance, French, English and German scholars, in order to cope with the demands made on them by the increasing number of new concepts, turned to the methods used by the Greeks to increase their vocabulary. These scholars were Hellenists or were advised by Hellenists. Thus, onto the European languages were grafted not only new AG elements but also new Term Formation Rules that copied those of AG, e.g. *ballistics*/French *balistique* 'βαλλιστική' < AG βάλλω.

I) We will consider of Greek origin any word or element that occurs as a result of transcription using the Latin alphabet, e.g. M I K P O B I O – *M I C R O B E*. Three cases can be included here: a) the emergence of new l.u. with AG elements, b) the emergence of new l.u. with indigenous elements whose construction is due to borrowing from AG (loan translations), e.g. χειρό-γραφον > *manu-script,* and c) emergence caused by borrowing of new meanings further to an existing l.u. We will deal with only the first case, wherein we distinguish three sub-cases:

A) A European language borrows directly from AG (direct loans from AG), e.gs French of the 16th century borrowed *misogyne* from AG μισογύνης, in the 18th century, the noun ἐγκέφαλος took the form *encéphale* etc.

B) A European language borrows an item from Latin that had been borrowed from the AG, e.g. the French. *bulbe* 'bulb' comes from the Latin *bulbus,* which comes from the AG βολβός (direct loans from Latin).

C) A European language constructs a word using elements borrowed from AG, e.g French coins the word *microbe* 'μικρόβιο' by borrowing from AG the elements μικρός, βίος.

Given the AG items appear in similar forms and with the same meaning in many languages, they belong to the category of internationalisms from an etymological point of view, e.g *telephone*. In terms of teaching and psycholinguistics, they belong to the category of cognates (cross-linguistic homotypes) that can be used as a key strategy in facilitating the understanding of scientific text and the teaching of scientific discourse and terminology.

II) In thematic terms, the type of word in the AG that is subject to borrowing belongs to academic and scientific vocabulary, i.e. it has to do with terms. The names of the sciences are stated in terms borrowed from AG, e.gs *archeology, economics, psychology*, but also generally the terminology of a science is based on terms borrowed from AG, e.gs basic terms of medicine, e.gs *symptoms, diagnosis, therapy*, branches of medicine, e.gs *hematology, anatomy, gynecology*, names of diseases, e.g. *asthma;* symptoms, e.g. *paralysis*; treatment, e.g. *chemotherapy*. Other disciplines: mathematics, geometry, trigonometry, e.gs *arithmetic, centre, diameter, symmetry, theorem, scheme, semitone, logarithm*, as well as geometric shapes: *circle, ellipse, hexagon*; physics, e.gs *microcosm, macrocosm*, *atmosphere*; astronomy, e.gs *chaos , planet, comet*; biology, e.gs *embryo, enzyme*; geography, e.gs *horizon, ocean;* geology, e.gs *epicentre, petro-;* philosophy/logic, e.gs *axiomatic, dialectic, dialogue, dilemma;* literature, e.gs *gramma, dialect, dissyllabic, diphthong;* rhetoric, e.gs. *epic, poetry, metaphor, metonymy;* sports, e.gs *Olympics, athlete, gymnastics, pentathlon*, *stadium;* theatre, e.gs *dialogue, drama, comedy, protagonist, scene, tragedy, choreography;* art, e.gs *muses museum, aesthetics;* music, e.gs *harmony, guitar, melody, pentagram, prosody, rhythm;* painting, e.g. *icon;* psychology, e.gs *(internal) dialogue, ecstasy;* human character, defects and divergences, e.gs *ironic, irony, cynical, cynicism, hypocrite, hypocrisy, melancholy;* mythical heroes and great men (generals, philosophers, scientists) whose names are connected with salient attributes, e.gs *narcissus (narcissism), chimera, Ariadne's thread, Pillars of Hercules, Euclidean geometry, draconian measures, Oedipus complex, platonic love;* Christian faith and institutions, theology, e.gs *Christ, angel, heresy, apocalypse, apostolic, baptize, demon, devil, cemetery, liturgy, martyr, prophet, psalm.*

III) Borrowings, however, are not limited to terms whether they be monosyllabic or polysyllabic, but involve borrowing sub-word units of the types:

A) Roots that result in semantic-etymological pairings with another word in Indo-European level, e.g. the AG term κύκλος becomes *circle*/ Fr. *cercle,* but coexists with the combining form *cycl(o)-,* i.e. in *hemicycle/hémicycle, cyclotron*.

B) Prefixes, e.g. AG ἀντι-> *anti-* e.g*. antiatomique,* and suffixes , e.g. AG -ειδής → *-oid,* e.g. *ellipsoid* 'ελλειψοειδής'.

C) Rules, (i) e.g. compound words retain the AG order. For example, based on AE γεωγραφία > *geography*/Fr. *géographie, photographie* (> MG φωτογραφία) is made up in French of the words φῶς, γραφὴ as well as (ii) the stem vowel *-o-,* e.g. *webometrics.*

In our opinion, borrowing of this type is more important than terminological borrowing, because it is both more dynamic and also in this way the Greek language influences the system for building terms in the recipient language, which in parallel with the rules at its disposal also adopts the mechanism of construction of terms in AG, namely, the AG Term Formation Rules in order to name new concepts that were unknown to the Greeks. European languages contain many prefixes of AG origin, e.gs. *a-/an- , anti-, arch-, dys-, epi-, meta-, para-, peri-, pre-, syn-/sym-, hypo-, hyper-,* etc., and many suffixes of AG origin, e.gs. *-ic, -ism,* the medical suffix *-itis* 'inflammation', e.g. *arthritis, -oma,* 'tumour/swelling', e.g. *melanoma, hematoma,* in chemistry, *-on* 'noble gases', e.gs. *argon, krypton,* in physics, *-on,* 'elementary particle', e.gs *hadron, baryon,* in linguistics, *-ema* 'unit of the abstract level of language', e.g. *phoneme, morpheme.*

IV) We put forward 2 kinds of reasons to explain why AG has played this role.

A) Linguistic reasons. AG has a rich vocabulary, because its speakers intensively cultivated it in all its sources (sciences, arts, etc.). During the Renaissance and in subsequent centuries AG was richer than the European languages, which had started independent life just a few centuries before although there are other rich languages nowadays. Also, Greek had the capability of being able to coin many words through derivation and compounding, i.e. through procedures which enable the combination of elements into a new whole. In particular, it has many such items, over 100 counted only combining forms, prefixes and suffixes, i.e. basic building blocks such as ἀντι- > *anti-,* μετα- > *meta-,* -ικός > *-ic.* However, Greek is not the only European language that has such elements.

B) Extralinguistic reasons. Greek was spoken by people who explored the world surrounding them and mankind in body and soul, striving not only to observe systematically in order to describe but to interpret phenomena, substance and structure of things, leaving aside the old beliefs and legends. They tried to understand and interpret the world in a scientific way through passionately researching the truth and by reducing the specific and the variable to the abstract and generalising, using a standard/model. As Professor and Member of the Academy Theodosis Tassios has maintained in his rich work (EMAET http://kotsanas.gr/gr/index_ekthemata.html), they developed technology that was advanced for that time on the one hand as a result of applying the theoretical knowledge they had gained and on the other, being in absolute connection to their everyday lives, which were facilitated by the various technological innovations.

Summarizing, we can say that Greece gave to the West what is now referred to as the Latin alphabet and to the East during the Christianization of the Slavs, the Cyrillic alphabet. She founded almost all sciences and by extension European culture, and highlighted the humanitarian attitude. From the time of the Renaissance, in particular, she laid the spiritual foundations of Europe, and the Greek culture was again the driving force in the evolution of Europe. This resulted in the catalytic linguistic contribution of the Greek language to European languages through classical Greco-Roman teachings. This effect is complemented by the influence of Christianity, where again the Greek language, as the

original language of the Gospels and the Acts of the Apostles, influenced European languages.

In such a way was constructed as a result of conceptual explosion, a stock of words needed in all sciences, or what is today called academic vocabulary. The Europeans borrowed the tools of thought which the Greeks invented alongside the words that expressed them. Thus was born metrology and the names of measuring instruments such as *barometer, thermometer, chronometer,* and the names of observational instrumentation, e.g. *microscope, periscope, telescope*. Hence arose the need to create classification categories. The Ancient Greeks broadened the role undertaken by the element -ειδής < εἶδος 'species, kind, article'. This element is semantically linked to the concept of SEEING (past tense form εἶδ(ον) 'saw' that serves as the past of ὁράω 'see'). The broadened role contributes to the classification of the entities between central and peripheral categories. The word εἶδος 'species, kind, article' constructs adjectives with the meaning 'one who resembles in form, shape, texture'. It is a transfer from ΒΛΕΠΩ 'literally see' in the real world (more accessible) and which we perceive it through our senses much better than ΕΚΤΙΜΩ 'I estimate that something is like something else'. This transfer helps evoke the world of thought (less accessible). In such a way European languages borrowed in the form *-oid/-oidal,* Fr *-oïde/-oïdal* in many scientific vocabularies, such as in medicine, biology, chemistry, physics, geometry, zoology, botany, mineralogy, psychology, anthropology, biochemistry, e.g. γεωειδής 'geoid', ελικοειδής 'helicoïdal' (Fr.), ελλειψοειδής 'ellipsoid', ημιτονοειδής 'sinusoidal', καρδιοειδής 'cardioid', παραβολοειδής 'paraboloid/ paraboloïde', σιγμοειδής 'sigmoid', σωληνοειδής 'solenoid', τραπεζοειδής 'trapezoidal', υπερβολοειδής 'hyperboloidal'.

Although there are no longer native speakers of AG, it continues to live through scientific terminology, and is an inexhaustible source for creating new terms and enriching the vocabulary of Greek and European languages, a fact which contributes to the scientific mutual understanding of the scientists of different countries since the cognates are used in the understanding of scientific texts and facilitates the teaching of terminology and generally of European languages and European culture. The borrowing of AG by European languages happened at a time when these languages had limited vocabularies when compared with AG and this continues to this day, while for centuries now they have contained linguistic wealth, because European languages not only borrowed words but also combining forms, prefixes, suffixes and above all Terms Formation Rules.

For this reason we bring to the forefront again our proposal for teaching to the scientific world of the European Union and also at a global level those elements of Greek used in academic/scientific discourse, i.e. combining forms, prefixes and suffixes, and Terms Formation Rules. Doing so will allow scientists to take a first step towards understanding the deeper scientific discourse in their mother tongue and also in many other languages, and then in a second stage to produce accurate terminology. If this proposal is implemented, terminology as a cultural option could substantially contribute to building the identity of scientists and particularly the European scientific identity and the democratization of knowledge.

AG = Ancient Greek.

l.u. = lexical unit.