Neoclassical internationalisms in scientific and popular terminology: a case study on Romance and Germanic languages

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Abstract

The paper reports on a comparative study of equivalence in scientific and popular terminology across Romance and Germanic languages. The study is carried out within the framework of Languages for Specific Purposes lexicography, and focuses on a corpus of medical terminology in seven European languages. The first aim of the study was to confirm or reject the international character of the terms of the corpus. The neoclassical etymology of the international words was highlighted, as well as the changes experienced in the loanwords to be adapted to the host lexical system. A second aim of the research undertaken was to analyse the corresponding popular language equivalents to the scientific medical terms studied. The hypothesis that Romance languages had a higher tendency to use international words in popular communication than Germanic languages, as stated by Stichele (2000), was only partially confirmed; English and French lexical items had more cases of overlap of scientific and popular terms than German and Spanish. As most of the scientific terms are mainly known by professionals but appear less accessible to lay audiences, the study claimed that specialized words should be substituted by their popular equivalents to reach a successful communication in doctor-patient healthcare interactions.

Keywords. Internationalisms; Word formation; Scientific terminology; Popular terms; Language of medicine; Equivalence.

1. Introduction

Word-formation has been defined as "that branch of the science of language which studies the patterns on which a language forms new lexical units, i.e., […] words" (Marchand, 1969: 2). The study of word-formation has deserved scholarly attention both synchronically and diachronically (e.g., Adams, 1973; Aronoff, 1981; Bauer, 1983; Halle, 1973; Lang, 1990; Marchand, 1969; Plag, 1999, 2000 and 2003, among others). Scientists often encounter or create new material, mechanisms or processes and are compelled to name them through different word-formation processes. Many current words in use to name specialized concepts in a scientific or technical area are similar across different languages. The use of neoclassical elements is a characteristic of

many scientific or technical lexical items. Lüdeling's (2006) investigation on neoclassical word-formation reported that many Latin and Greek elements found their way into the European languages, as these languages were the official languages in many countries for many centuries. The use of prefixes, suffixes and combining forms plays an important role in neoclassical word-formation (see Author, 2011, 2013) and, as Ivir (1989) contended, the final result is a word which implies word-formation experience.

European languages may use similar word-formation processes in search of new terminology. The international standardization of the new scientific language is within the working methods and principles of terminology science (Cabré, 1999).

Specialized terminology, specifically domains with a very long tradition like medical terminology, makes use of a great number of neo-classical formations (Estopá et al., 2000). The aim of this article is to compare scientific medical terms in different languages in their strive for optimum equivalents of learned words, and the use of popular terms to name them. Although word formation is an issue of current debate, especially in todays' period of dynamic lexical innovation and creativity, the morphology of international words is a topic in need of specific research. Additionally, the justification of this study is the increased awareness of the problems posed by Greek or Latin-based terms to lay audiences in specialized medical communication. In daily practice the doctor profession experiences that, from the perspective of patients, neoclassical medical lexical items are sometimes hard to understand both orally and in written interactions. Readability and legibility of documents containing these terms are sometimes confusing because of the patients' lack of precise knowledge of specific medical terminology and their classical morphological components. In this context, research on the meaning of words offers a new dimension to the investigation of the medical professional language (Wulff, 2004).

2. Internationalisms

Scholarly research has documented the use of identical vocabularies found in three areas: everyday interaction containing words for commonly used objects; vocabularies of conceptual and specialized areas; and languages for special purposes (Braun, 1989, or McArthur, 1998). These identical words are known as internationalisms. Scientific and technological standardization has favoured the use of a core of common loan words in many European languages. Despite the fact that internationalisms are generally referred to languages spoken in Europe, their presence has been documented not only in European languages but also in Japanese, Malay, Philippine and other Asian languages (McArthur, 1998).

Scientific and technical vocabularies are specialized words, frequently of an international character due to their current use in several modern languages. Relatedly, The *Webster's Third New International Dictionary* (Gove, 1961) first defined internationalisms as "a part of the vocabulary of the sciences and other specialized studies that consists of words or other linguistic forms current in two or more languages and differing from New Latin in being adapted to the structure of the individual languages in which they appear". As Latin and partly Greek were the European *linguae franca* and the official languages in many countries for many centuries, their presence in many European languages is unsurprising. An assimilation of the neoclassical words is generally shown in the target language. The classical Latin and Greek nature of scientific and technical lexical items is sometimes adopted in the target language without any change, but sometimes adapted to the target language undertaking slight morphological and phonetic changes to be adapted to the host lexical system. According to Ivir (1998) international words have a much better chance of adoption than words restricted to a single language because of the following reasons:

> "First they stand for concepts clearly in need of lexicalization in different cultures and languages; second, with cultural and linguistic stimuli coming from several directions at once, there is more pressure for the adoption of internationally accepted lexicalizations-, third, owing to their international character, internationalisms are seen as a threat to the linguistic identity of a given national language than words belonging exclusively to another national language; fourth a body of internationalisms is already present in any national language, which therefore has more or less well established ways of dealing with such words" (ibid: 149).

Furthermore, the process of terminology internationalization keeps growing; as Deleger et al. (2006: 188) posit "on the one hand, controlled specialized vocabularies evolve into international standards and, on the other hand, more countries' level of information technology require interoperable vocabularies obtained from such international standards". This increase of the current inventory of international words has made authors highlight a tendency toward linguistic convergence (Braun, 1989, Schaeder and Volmert, 1990, 2003).

3. Scientific vs. popular terminology

Specialized languages can be used with a higher or lower degree of specialization (Cabré, 1999). Differences can be observed when the interaction takes place within a circle of medical practitioners, or when it is addressed to non-specialists, i.e., people outside the profession. Patients frequently state that most clinical reports both oral and written are delivered at a grade level too high for patients to understand. Generally speaking, despite differences in age, intelligence or social background, laymen frequently experience difficulties in understanding specialized medical terms. Based on recent research, Mayer and Villaire (2009) document the difficulty shown by more than half the adults in the United States (US) coping with healthcare information. A common problem that patients complaint about when reading medical reports provided by their doctors is, according to Hoste et al. (2007), not being able to fully understand the expert language. As Charles et al. (2000) posit, the voice of patients is characterised by a non-technical discourse which affects the vocabulary used related to their health problems and medical processes. As a result of the popularization of science, some scientific terms gradually become part of daily speech, thus facilitating their comprehension. However, research has shown that the use of scientific terminology is one of the factors which greatly impedes the readability of medical information (Van Vaerenbergh, 2007).

Many terms that pose problems are international scientific names of Greek or Latin origin, mostly known by professionals engaged in general practice in the medical field but not fully understood by people laymen. Accordingly, the point of departure of the present study is the existence of neoclassical terminology in medical contexts that may coexist together with terminological equivalents that are more suitable to be understood by a lay audience.

4. Research questions

A number of common questions that need to be addressed in morphological theory regarding medical vocabulary are dealt with in this research:

Research question 1. Does the medical terminology used to name diseases show a Latin or Greek origin?
Hypothesis: Although internationalisms may also come from a modern language, neologisms coined from Greek or Latin roots provide a common store for the formation of such words.

Research question 2. Do European languages share the same medical terminology?
Hypothesis: The language of medicine is characterised by the eventual flow of concepts and words from one tongue to another.

Research question 3. Do Romance languages tend to use popular terms to substitute neoclassical scientific terms?
Hypothesis: French, Spanish, Italian and Portuguese vocabularies contain a number of popular terms which are identical to the original scientific term, as documented by Stichele (2000).

5. Design of the study

The steps undertaken in this research were the following:

1. To build a corpus in seven European languages of medical internationalisms related to common diseases or health alterations. The corpus processed in the present work was built from Stichele (2008). *Multilingual glossary of technical and popular medical terms in nine European languages* (http://users.ugent.be/~rvdstich/eugloss/welcome.html), a project commissioned by The European Commission (DG III). The European languages studied were Romance languages, French, Italian and Portuguese and Spanish; and Germanic languages: Danish, Dutch, English and German.

2. To study the morphological changes undergone by the international lexical item to be adapted to the host lexical system.

3. To compare the use of scientific names of the internationalisms to the corresponding popular names they are referred to in the seven European languages under study.

6. Results and discussion

From the large number of terms related to diseases or health alterations, the following words related to different medical specialties were selected after a random sampling process: *amblyopia, amnesia, anaemia, bronchitis, cardiopathy, carcinoma, cirrhosis, dermatitis, hepatitis, laryngitis, neuralgia, neuritis, osteomyelitis, osteoporosis, pleurisy, pharyngitis* and *pneumonia.* These terms formed the corpus for the purpose of the present research. The answer to the research questions posed will confirm or reject the hypotheses stated.

Research question 1. Does the medical terminology used to name diseases show a Latin or Greek origin?

A dictionary definition of the terms from the *Online Etymologycal Dictionary* will document their meaning and etymology

amblyopia	1706, "weakening of the eyesight," medical Latin, from Greek *amblyopia* "dim-sightedness," noun of action from *amblys* "dulled, blunt" + *ops* "eye".
amnesia	"loss of memory," 1786 (as a Greek word in English from 1670s), Modern Latin, coined from Greek *amnesia* "forgetfulness," from *a-*, privative prefix, "not".
anaemia	1824, from French medical term (1761), Modern Latin, from Greek *anaimia* "lack of blood," from *anaimos* "bloodless," from *an-* "without" (see *an-* (1)) + *haima* "blood" (see *-emia*).
annorexia	1590s, "lack of appetite," Modern Latin, from Greek *anorexia*, from *an-*, privative prefix, "without" (see *an-* (1)) + *orexis* "appetite, desire," from *oregein* "to desire, stretch out".
bronchitis	coined in Modern Latin 1808 by Charles Bedham, from *bronchia* "the bronchial tubes" (plural; see *bronchial*) + *-itis.*
cardiopathy	before vowels *cardi-*, word-forming element meaning "pertaining to the heart," from Latinized form of Greek *kardia* "heart". *-pathy*: word-forming element meaning "feeling, suffering, emotion; disorder, disease," from Latin *-pathia*, from Greek *-patheia* "act of suffering, feeling" (see pathos). Meaning "system of treatment of disease".
carcinoma	"malignant tumor," 1721, from Latin *carcinoma*, from Greek *karkinoma* "a cancer," from *karkinos* "cancer," literally "crab".
cirrhosis	1827, coined in Modern Latin by French physician René-Théophile-Hyacinthe Laennec (1781-1826) with -osis and Greek *kirrhos* "tawny," of unknown origin. So called for the orange-yellow appearance of the diseased liver.
dermatitis	1876; see *dermato-* + *-itis*. before vowels, *dermat-*, word-forming element meaning "of or pertaining to skin," from Greek *dermato-* (shortened form *dermo-*), from *derma* "skin".
hepatitis	1727, coined from Greek *hepatos*, genitive of *hepar* "liver," from PIE root **yekwr-* (cf. Sanskrit *yakrt*, Avestan *yakar*, Persian *jigar*, Latin *jecur*, Old Lithuanian *jeknos* "liver") + *-itis* "inflammation."
laryngitis	1822, Medical Latin, from comb. form of larynx (q.v.) + -itis.
neuralgia	1807, from Greek *neuron* "nerve" (see *neuro-*) + *-algia*. Probably formed on model of French *névralgie* (1801).

neuritis	"inflammation of a nerve or nerves," 1825, from Greek *neuron* "nerve"
osteomyelitis	before vowels oste-, word-forming element meaning "bone, bones," from Greek osteon "bone".
osteoporosis	1846, from *osteo-* + stem of Greek *poros* "passage, pore, voyage" (see pore (n.)) + *-osis*.
pleurisy	late 14c., from Old French *pleurisie* (13c., Modern French *pleurésie*) and directly from Late Latin *pleurisis* "pleurisy," alteration of Latin *pleuritis* "pain in the side," from Greek *pleuritis*, from *pleura* "side of the body, rib," of unknown origin. Spelling altered in Late Latin on model of Latin stem *plur-* "more" (cf. Medieval Latin *pluritas* "multitude"), as if in reference to "excess of humors".
pharyngitis	1824, from stem of *pharynx* + *-itis*. 1690s, from Greek *pharynx* (genitive *pharyngos*) "windpipe, throat," related to *pharanx* "cleft, chasm".
pneumonia	c.1600, from Modern Latin, from Greek *pneumonia* "inflammation of the lungs," from *pneumon* "lung," altered (perhaps by influence of *pnein* "to breathe") from *pleumon* "lung," literally "floater," probably cognate with Latin *pulmo* (see *pulmonary*), from PIE **pleu-* "to flow, to swim" (see *pluvial*). Alteration in Greek perhaps by influence of *pnein* "to breathe".

These definitions suggest that most of the medical terms analyzed came to English directly from Greek or Latin, or through one of the Romance languages, i.e., Latin into French, and then into English. As shown in the above definitions, the classical nature was manifested in all the terms of the corpus. The initial hypothesis regarding this research question was largely confirmed, as all the words in the corpus had a Greek or Latin root. *Aneamia* and *pleurisy* have a classical etymology and made their way into English through French.

Research question 2. Do European languages share the same medical terminology?

To see if the neoclassical English terms studied were used by other European languages, a search was made to find out the meaning of these terms in Danish, Dutch, Italian, French, German, Portuguese and Spanish. These languages were separately analyzed according to their Germanic or Romance background. Tables 1, 2 and 3 below show the equivalents of the terms in these languages based on Stichele (2000).

Equivalents in Germanic and Romance languages 1.

Germanic languages						
	Term1	Term2	Term3	Term4	Term5	Term6
Danish	*amblyopi*	*anæmi*	*anoreksi*	*cardiopathi*	*carcinom*	*cirrose*
Dutch	*amblyopia*	*anaemia*	*anorexia*	*cardiopathie*	*carcinoom*	*cirrose*
English	*amblyopia*	*anaemia*	*anorexia*	*cardiopathy*	*carcinoma*	*cirrhosis*
German	*Amblyopie*	*Anämie*	*Anorexia*	*Kardiopathie*	*Karcinom*	*Zirrhose*
Romance language						
French	*amblyopi*	*anemia*	*anorexie*	*cardiopathie*	*carcinome*	*cirrhose*
Italian	*ambliopia*	*anemia*	*anoressia*	*cardiopatia*	*carcinoma*	*cirrosi epatica*
Portuguese	*ambliopia*	*anemia*	*anorexia*	*cardiopatia*	*carcinoma*	*cirrose*
Spanish	*ambliopia*	*anemia*	*anorexia*	*cardiopatía*	*carcinoma*	*cirrosis*

Table 1. Medical words related to health alterations in 7 European languages

Equivalents in Germanic and Romance languages 2.						
Germanic Languages						
	Term7	Term8	Term9	Term10	Term11	Term12
Danish	*dermatitis*	*hepatitis*	*laringitis*	*neuralgi*	*neuritis*	*osteomyelitis*
Dutch	*dermatitis*	*hepatitis*	*laringite*	*neuralgie*	*neuritis*	*osteomyelitis*
English	*dermatitis*	*hepatitis*	*laryngitis*	*neuralgia*	*neuritis*	*osteomyelitis*
German	*Dermatitis*	*Hepatitis*	*Laringitis*	*Neuralgie*	*Neuritis*	*Osteomyelitis*
Romance Languages						
French	*dermatite*	*hépatite*	*laringite*	*névralgie*	*névrite*	*ostéomyélite*
Italian	*dermatite*	*epatite*	*laringitis*	*nevralgia*	*nevrite*	*osteomielite*
Portuguese	*dermatite*	*hepatite*	*laringite*	*neuralgia*	*neurite*	*osteomielite*
Spanish	*dermatitis*	*hepatitis*	*laringitis*	*neuralgia*	*neuritis*	*osteomyelitis*

Table 2. Medical words related to health alterations in 7 European languages

Equivalents in Germanic and Romance languages 3.

Germanic Languages					
	Term13	Term14	Term15	Term16	Term17
Danish	*osteoporosis*	*pleuritis*	*pharyngitis*	*Tracheitis*	*pneumonia*
Dutch	*osteoporose*	*pleuritis*	*faryngitis*	*tracheitis*	*pneumonie*
English	*osteoporosis*	*pleurisy*	*pharyngitis*	*tracheitis*	*pneumonia*
German	*Osteoporose*	*pleuritis*	*Pharyngitis*	*tracheitis*	*Pneumonia*
Romance Languages					
French	*ostéoporose*	*pleurésie*	*pharyngite*	*trachéite*	*pneumonie*
Italian	*osteoporosi*	*pleurite*	*faryngite*	*tracheite*	*polmonite*
Portuguese	*osteoporose*	*pleurisia*	*faryngite*	*traqueíte*	*pneumonia*
Spanish	*osteoporosis*	*pleuritis*	*faringitis*	*traqueítis*	*neumonía*

Table 3. Medical words related to health alterations in 7 European languages

The examples above shown manifested the use of the same term in the different languages studied to name the same concepts. No generalized distinction cropped up regarding Germanic and Romance languages. The scientific medical terms analysed showed a neoclassical equivalent in all the European languages studied, irrespective of their Germanic or Romance background. The classical nature was shown in the root, and even better evidenced by the incorporation of the suffixes *-itis, -ia, -osis,* or *–oma.* The etymology of these suffixes and the minor morphological changes made in the adaptation of these suffixes to each individual language were:

- The noun suffix *itis,* denoting diseases characterized by inflammation in Modern Latin, from Greek *–it is,* was substituted in our corpus by *–ite* in some Romance languages, e.g., Italian and French.
- *ia,* Latin from Greek *–ia,* a suffix that forms nouns; state of, condition of, quality of, act of, was changed in the corpus into *-ie* in Dutch and French.
- *-osis,* a word-forming element expressing state or condition, in medical terminology denoting "a state of disease," from Latin *-osis* and directly from Greek *–osis*; *this suffix adopted the form -osi in Italian or –ose in Dutch and Portuguese.*
- The suffix forming neuter nouns and nouns that indicate result of verbal action, *oma* comes from Greek *-oma,* with a lengthened stem vowel + *-ma,* (equivalent of Latin *-men*); especially taken in medical use as "morbid growth, tumor". In the corpus, the suffix *–oma* was kept in Italian, Portuguese and Spanish; and adopted the form *–ome* in French. Dutch transformed it into *-oom.*

Additionally, the differences observed regarding the change of the spelling *ph* (phonologically sounding *f*) into *f* in Dutch, Italian, Portuguese, Spanish, or the use of capital letters in all the German nouns are general characteristics of the idiosyncrasy of these languages and, thus, were behind the scope of the present research.

The hypothesis on the eventual flow of concepts and words from one language to another was confirmed in the analysis of the corpus, as the same terms were used in the languages studied and only minor morphological changes affected the suffixes used.

Research question 3. Do Romance languages tend to use popular terms to substitute neoclassical scientific terms?

For the purpose of this research, English and German were taken as representative of Germanic languages, and French and Spanish of Romance languages to compare the use of specialized terms by laymen. Table 4 compares the use of the technical terms to their popular use by people outside the medical profession.

Technical & Popular English	**Popular German**	**Popular French**	**Popular Spanish**
ambliopía (t) *sight problems* (p)	*Schwachsichtigkeit*	affaiblissement de la vue	*vision reducida*
anaemia (t) *anaemia* (p)	*Blutarmut*	anémie	*escasez de sangre o deficiencia en la sangre de glóbulos rojos*
anorexia (t) *anorexia* (p)	*Magersucht*	anorexie	*alta de apetito o ansia de adelgazar; pérdida de apetito*
cardiopathy (t) *heart disease* (p)	*Herzfehler*	maladie de coeur	*dolencia o afección cardiaca*
carcinoma (t) *cancer* (p)	bösartige Geschwulst	tumeur maligne	*tumor nocivo, cáncer*
cirrhosis (t) *liver disease* (p)	Leberschrumpfung	cirrhose	*enfermedad caracterizada por una degeneración del hígado*
dermatitis (t) *skin problems* (t)	Hautentzündung	inflammation de la peau	*inflamación de la piel*

hepatitis (t) *hepatitis* (p)	Leberentzündung	hépatite	*inflamación del hígado*
laryngitis (t) *sore throat* (p)	KehlkopfentzÜndung	inflammation du larynx	*inflamación de la laringe*
neuralgia (t) *neuralgia* (p)	Nervenschmerz	névralgie	*dolor en el trayecto de los nervios*
neuritis (t) *nerve inflammation* (p)	Nervenentzündung	névrite	*inflamación de un nervio*
osteomyelitis (t) *bone inflammation* (p)	Entzündung des Knochenmarks	infection de l'os et de la moelle osseuse	inflamación de la médula ósea
osteoporosis (t) *osteoporosis* (p)	Verminderung des Knochengewebes	fragilisation des os	*desmineralización esquelética*
pleurisy (t) *pleurisy* (p)	Rippenfellentzündung	inflammation de la plèvre	*inflamación de la membrana que reviste los pulmones y la cavidad torácica*
pharyngitis (t) *sore throat* (p)	Entzündung der Rachenschleimhaut	inflammation du pharynx	*inflamación de la garganta*
pneumonia (t) *pneumonia* (p)	Lungenentzündung	inflammation des poumons liée à une infection	*inflamación de los pulmones*
tracheitis (t) tracheitis (p)	Entzündung der Luftröhrenschleimhaut	trachéite	*inflamación de la tráquea*

Table 2. *Popular medical terms: Germanic vs. Romance languages*

The data above show that 8 English terms out of the total (17) used the technical term in a popular context (53%). French followed behind, as 7 French terms were also used by people outside the medical profession (41%). English (Germanic) and French (Romance) lexical items had more cases of overlap of scientific and popular terms than German (Germanic) and Spanish (Romance). German and Spanish showed no entries of scientific terms used as popular terms. According to scholarly research, when analyzing the differences between Germanic and Romance languages, Stichele (2000) had stated that Romance languages should not require a popular equivalent; because of the Latin origin of many scientific medical terms, they should pose no problems to native speakers of Romance languages. This

should justify the existence in French and Spanish vocabularies of most scientific terms also used popularly, i.e., identical to the original scientific term. However, this was not the case of the results of our study.

On balance, the initial hypothesis that French, Spanish, Italian and Portuguese vocabularies contained a number of popular terms which were identical to the original scientific term, as suggested in Stichele's (2000), was only partially confirmed; in Stichele's glossary (2000), Spanish popular terminology was widely provided as a substitute for the scientific terms.

7. Conclusions and educational implications

The present research confirmed the presence of internationalism in medical contexts and their neoclassical etymology. The analysis of the corpus highlighted the minor changes experienced in the loanwords so to be adapted to the target language. English was the language which showed more cases of overlap between scientific and popular terms than other languages. This study showed that the use of scientific terms in medical popular discourse is more generalized in English and French than in Spanish and German.

Additionally, this investigation pointed out that due to the neoclassical etymology of medical terms, their meaning is not always easy for laymen to understand. Hence, the use of popular terms can make the information clearer to the people outside the medical profession and, thus, promote more effective doctor-patient interactions which can ensure the correct transmission of information in specialized contexts. In this line of thought, this study supports Mayer and Villaire's (2009) who recommend the use of popular terms as an alternative to specialized terminology: "Use medical terms only if a substitute phrase is either not available, or is more difficult to understand than the term itself, or if the patient will understand the word because of previous experiences" (ibid, 2009).

The research here undertaken was only a first step into the characteristics of the interchange scientific and popular terminology. However, the results obtained could be biased because of the translators involved in Stichele's (2000), on which the language equivalents of the present study were based. Further research will count on a larger corpus and will incorporate a survey run with patients following medical treatment in a hospital; a multiple choice test will aim at measuring the full comprehension of the meaning of the scientific or popular terms of this corpus.

The conclusions drawn from this investigation have educational implications that can be put into practice in Language for Specific Purposes settings. These implications relate to the practice of

basic morphology rules in academic environments. As a growing body of academic research is beginning to demonstrate the power and potential of a Latin-Greek approach to vocabulary instruction (Rasinski et al., 2011), learning medical terminology can be facilitated by the practice of word-formation rules in the Language for Specific Purposes classroom. By gaining experience in the process of forming and decoding medical terminology, valid information will be provided to facilitate the meaning involved.

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