Teaching English for Computer Science in the Algerian Departments of Translation

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Abstract:

The objective of this paper is to examine and describe what would be considered as a computer science register at the vocabulary (or lexicon) level. What is meant by computer science register vocabulary is that terminology that is recurrent in most computer sub-registers; and, this may partly provide an anticipated answer to the first present research question. Indeed, the would-be specialists in translation need to get familiar with the different characteristic components of the computing register and how they are constructed. We are specifically interested in this registral vocabulary from a semantic perspective. Semantics is the scientific study of meaning in the sense that it tackles how linguistic elements interrelate with extra-linguistic forms.

Keywords: Computer Science; Language; Teaching; Translation; English.

1. Introduction: Computer Language Situation in Algeria

The fact that nature is the essence of mankind's existence is inconvertible. What exists and results from human intervention, yet, cannot be natural. These unique mental and cognitive potentials has made Man, their possessor, add a special touch to human essence. No goal is out of reach and their goal of reaching better living conditions found an echo in inventions. The prior knowledge of invention, technology, has turned

inseparable from contemporary everyday life. Computers are technological tools displacing day after day such classical materials as copybooks, books and pens at work and/ or home. Whether adults or children, individuals are more and more (even unwillingly sometimes) becoming dependent to computer facilities. Another ubiquitous computing service is without a doubt internet standing probably for intercommunication network.

Countless is the number of those internet users who are getting stuck to their mailbox checking and/ or social network (facebook, twitter, whatsapp) sharing. E-newspapers are available, and e-books, for free over internet, as well as advertised objects which are many times sold online. Long-range inter-contact is speedily becoming a must via telecommunication software such as skype and/ or viber. In sum, computers and "…their science have… constituted a crucial ingredient of human life and prompted their ineluctable influence over their users" (Labed, 2013: 121). Computer science (or computing) hallmarks seem, likewise, worth of attention. Computer register is a type of language typically specialised and employed within the groundwork of the above scientific field which does not quit proliferating to give birth to further sub-fields, each with its own more specific sub-register.

Despite of the worldwide technology monopoly of English language, computer science specialty is mostly instructed in French language at the level of the Algerian university where teaching and research come into play. When pursuing their further studies, computer science teachers (whose former education was especially

in French) are, still, required to produce their research writings in English. Many of them find this task a challenge and call urgently upon translators to help them face their English language difficulties. It is the job of university and higher school departments of translation to prepare professional and well-qualified translators in specialised languages, or registers in short. What computer (sub-) register(s) should be taught? How could it/ they be introduced, at all, to translation learners?

The objective of this paper is to examine and describe what would be considered as a computer science register at the vocabulary (or lexicon) level. What is meant by computer science register vocabulary is that terminology that is recurrent in most computer sub-registers; and, this may partly provide an anticipated answer to the first present research question. Indeed, the would-be specialists in translation need to get familiar with the different characteristic components of the computing register and how they are constructed. We are specifically interested in this registral vocabulary from a semantic perspective. Semantics is the scientific study of meaning in the sense that it tackles how linguistic elements interrelate with extra-linguistic forms.

2. Methodology

As for methodology, it was proceeded as follows. It happened that the researcher taught in the department of computer science, University of Oran (Algeria). As time went by, she started to notice the nature of vocabulary used by computer teachers, and that she had been already familiar with an important portion of this vocabulary usually prevailing in everyday interactions.

She, then, thought of making use of a dictionary. Dictionaries are designed to deal with meaning of lexical items, phrases, sentences and other language stretches. Evidently, the researcher's choice fell on a technical dictionary in computer science as the primary source of data at hand. It is entitled Dictionnaire encyclopédique bilingue de la micro-informatique[1] (1999).

The researcher was fully aware of computer science as a dramatically progressing field over time. She was also conscious enough that it was likely relevant, in that case, to refer to a more recent dictionary edition which was instantly unavailable at her disposal. This situation would probably not put her at a disadvantage since she opted, too, for the questionnaire (see Appendix) as a complimentary check-method. The selected list of dictionary items represented those lexical forms which seemed, at least for the researcher, to occur frequently in Algerian daily speech, in the form of switches[2] and borrowed lexemes (or words)[3]. What could not be perceived in the dictionary, nevertheless, is the frequency of items under selection during lectures. The role of the questionnaire was to measure this frequency and to further reduce the lexical list according to computer science teachers' use of the items.

The researcher e-mailed 13 copies of the questionnaire, but received in return 07 answered copies: 06 males and 01 by a female teacher, aged between 33 and 53 years old, filled in the questionnaire. Due to time restrictions, the researcher had to complete the present paper before obtaining other answered copies. Therefore, she was content with the aforementioned number. The

current questionnaire is in French and composed of six columns. While the first column consists of 115 (see Appendix) lexical dictionary items[4], the other columns were partly open and partly guided. The open columns were column 3 (the informants were free to provide the subject matter within which they make use of one or another item) and column 4 where they had to fill in with synonyms if there were any. Regarding the guided columns 2, 5 and 6, the teachers in question were expected to tick where appropriate according to their (non-)use (Chomskian performance)/ knowledge (Chomskian competence) of each lexical item.

The lexemes that would be presently considered are those which are majorly if not fully used, that is [4/7, 7/7][5] (see Appendix). The interval involves the number of occurrence of each lexical item according to the results of column 2 + (added to) the results of column six. Column 5 confirms the results of column 2 and column 4 will not be considered, given that it was filled in by a minor group of informants (02). Column 3 will help analyse the findings shown in the Appendix, whereas discussion will be undertaken just below.

3. Lexical History

A diachronic approach could be undertaken on the current data. Semantically speaking, French (and few English) lexemes[6] have gone through alteration under the effect of various phenomena. Some phenomenal manifestations have been direct while some others were non-direct. Lexical history is exemplified presently as semantic change (direct manifestation) on the one hand and on the other metaphor (non-direct manifestation).

The history of lexemes seems very useful in clarifying, to translation learners, the path followed by these lexemes in their temporal evolution. Such a better understanding very possibly keeps, in the long term, the learners' computing lexical part of memory activated and fresh.

3.1. Semantic Change

Change in language is the rule. Every linguistic level is changeable and meaning can afford an appropriate illustration. Many lexemes have born semantic changes in all the world languages. Crystal (1999: 138) recognises four types of such a change. The first type is known as extension or generalisation whereby the meaning of one lexical item is enlarged. The second type of semantic change is specialisation or narrowing through which a given lexical form survives restriction in its meaning. Another change type is amelioration whereby the lexeme gains a positive sense of approval. By contrast, a negative sense of disapproval is obtained by a lexeme through deterioration or pejoration. The latter process is the fourth type of semantic change. In the present corpus, we came across the two first types.

Term and gloss	Prior meaning	New meaning(s)
administrateur *administrator*	A person in charge of managing an institution	A person in charge of managing a multi-user computing system, communication system or both
bruit *noise*	A sound usually loud and disturbing	1. Set of non-desired electrical signals produced either naturally or by circuit, damaging the quality or performance of a

		communication canal 2.Any interference which affects the machine running
bureau *desktop*	1.an office where someone works 2.A piece of furniture like a table that one sits at often to work 3.A place where one can be served at	A computer screen which represents a working area

Table 1[7] Extension or generalisation

In Table 1, it is clear that the item 'administrateur' (7/7) has, in ordinary speech, one meaning which has been extended to also concern computer systems. The item 'bruit' (5/7) has further acquired, at least, two technical meanings. 'bureau' (6/7) which has already ordinary meanings has obtained an additional computing meaning.

Term and gloss	Prior meaning	New meaning(s)
Window	An opening usually in the wall and usually covered by glass	In application and graph interfaces, ascreen space with its own documents or messages
virus *virus*	Too small living things that evoke infectious disease in other living things	Software infecting files by inserting a copy of it in these files

Table 2 Narrowing or specialisation

Although 'fenêtre' *window* still carries both the ordinary and technical meanings, its English equivalent (window) however is more and more getting related to

computers. What happens to ‘window’ (7/7) affects, too, the lexical item ‘virus’(7/7) (see Table 2).

3.2. Metaphor

Who says that a metaphor narrows to literature? It is “… a property of our conceptual system, a way of using language that structures how we perceive things, how we think, and what we do” (Kramsh, 2009: 129). The concept comes into play whenever the subject of new word creation is evoked. As a definition, a metaphor tackles things seemingly divergent in relationship but emphasises their actual common points. It, broadly speaking, comprises three components (Cowie, 2013); the tenor is seen as the subject to which a number of characteristics are assigned, the vehicle or the object sharing and transmitting these same characteristics, and the ground: the points (these characteristics) of similarity between the first two components, the tenor and vehicle. Examples are given as follow,

Components	Metaphor 1	Metaphor 2	Metaphor 3
tenor	folder	circuit	processor
vehicle	Corbeille *recycle bin* (6/7)	Horologe *clock* (7/7)	Moteur *engine* (6/7)
ground	function	time	management

Table 3 Metaphorical Components

Metaphors are subdivided, by Crystal (1999), into three categories. Concrete metaphor whereby abstraction (e.g. structure, computer space, information unit) becomes visual and substantial (arbre *tree* (7/7), bureau *desktop* (6/7), enveloppe *envelope* (5/7) respectively). Animastic metaphor: animate features (e.g. cellule (7/7), virus (7/7)), are transmitted to inanimate things (room,

software respectively). Last but not least, humanising metaphor through which human peculiarities (e.g. intelligence (7/7), mémoire (6/7), lecteur (6/7)) are allotted to non-human things (capacity, means, material respectively).

4. Word-Formation: Lexicalisation

In addition to the notions previously raised, lexicalisation is another process of word-formation whereby new (complex) words spring up. The use of derivative words, within translation areas, has proved economical as it allows saving time, space and energy. Learning one item rather than a set of items (sentence) indeed takes temporally a shorter period and the learners' memory could not be spatially overloaded when grasping, instead of sentences and paraphrases their corresponding, separate items. This again makes the learners familiar with a more considerable number of computing lexemes via a reduced amount of energy. As an illustration, the three lexical items 'branchement' *branch*, 'serveur' *server*, 'passerelle' *gateway* are formed, as follows, and economically used instead of their explanatory sentences,

1. brancher + suffix 'ement' = branchement (5/7) (instead of 'any connection between two elements')
2. servir + suffix 'eur' = serveur (7/7) (instead of 'a network computer that manages this network')
3. passer + suffix 'elle' = passerelle (7/7) (instead of 'network connection material using different communication protocols')

5. Meaning Relationships

When talking about relationships in meaning, semantic structure and semantic field arise in the first place. Other such relationships are probably as polysemy, homonymy, synonymy and hyponymy.

5.1. Semantic Structure

The way computing terminology should be introduced to students cannot be random, but smooth and systematised. A fruitful concept in teaching such a matter is semantic structure. All lexemes, in fact, witness relationships among themselves, and form a network of meaning connections or what is denoted as semantic structure. Some lexemes connect closely, others remotely and still others more remotely and/ or loosely. In the present corpus, the item 'branche' *branch* (5/7) is closely related to 'arbre' *tree* (7/7) and both lexemes relate less closely to names of creatures such as 'souris *mouse* (7/7), virus *virus* (7/7), bug (5/7)'. All these living things may be in one area designated as 'champ' *field* (6/7).

The lexeme 'arbre' is more remotely related to the lexeme 'champ' compared to its relationship with the lexeme 'virus'. On the other hand, one might think about 'intelligence' *intelligence* (7/7), and then move attention straightforward to 'mémoire' *memory* (6/7) perhaps because they are both mental. And again, they, even though abstract, can lead the person to conceptualise something more concrete, such as 'cellule' *cell* (7/7). It seems more illuminating to expose the learners to lexical categories of related items. Semantic structure can save effort and time given that it offers a much easier and faster learning of the specialised terminology in question.

5.2. Semantic Field

Semantic (or lexical) field refers to a given meaning sphere to which certain items are associated and could, in one way or another, identify themselves reciprocally. Computer science, as one semantic field, does not quit broadening over time, and splitting up into sub-fields. This facilitates computing tasks of specialists who can work, in parallel, and collaborate. According to the informants, the sub-field 'réseaux' *network* is the frame of the items 'bus *bus*(6/7), bruit *noise* (5/7)', agent *agent* (6/7)' whereas 'algorithms' indicates the sub-field of 'branchement *branch* (5/7), arbre *tree* (7/7), cellule *cell* (7/7)'. The same could be said about 'intelligence and migration *migration* (5/7)' which are affiliated to the sub-field IA 'intelligence artificielle' *Artificial Intelligence*.

Such sub-division is not always clear-cut though. One difficulty may emerge when trying to specify the appropriate semantic sub-field to which relate some given lexemes. Whether 'bruit' is assigned to IA or 'génie logiciel *software engineering*/ réseaux *networks*/ traitement d'images *image processing*' is debatable. The semantic field 'système d'information *information system*' groups 'administrateur *administrator* (7/7) and environnement *environment* (6/7)' which both also come under the heading of 'réseaux' *networks*. The following table gives further examples,

Terms	Arbre	Héritage	Agent	Horloge
Semantic (sub)fields	Classification[8] Réseaux Algorithmique Théorie des graphes[9]	Programmation[10] Algorithmique Réseaux	IA Réseaux	Système d'exploitation[11] Bureautique[12] Réseaux

Table 4 Semantic Sub-fields

Despite this, the apparent semantic complication could be regarded as an advantage from a different angle: " That these accounts are illuminating can be seen from their growing use in such domains as foreign language teaching…, where it has proved helpful to present learners with sets of related lexemes, rather than a series of randomly chosen items" (Crystal 1999: 157). Instructing translation learners the terminology of every, computing, sub-field separately is, needless to say, far reaching due mainly to limitations in the time allotted to institutional course teaching. Semanticisists' role in grouping the lexemes recurring in most computing sub-fields is another probably economical way. Meanwhile, it is also time-saving to teach lexemes already common in everyday usage with new different meaning(s) in computing (sub-) register(s). The table below is an illustration,

Terms and gloss	Daily usage	Specialised usage
Pilote *driver* (5/7)	aircraft driver	a computing material controlling another computing material
police *typeface* (5/7)	state organization against law-violation	particular conception of printing symbols

Table 5: Semantic Field

What happens is the fact that translation learners internalise some new knowledge (computing terminology) in association with their prior or schematic knowledge (daily usage). Widdowson (2011: 28) asserts: "you cannot make sense of anything without bringing it within the confines of what is preconceived as familiar".

5.3. Polysemy vs Homonymy

The origin of meanings and their proliferation is a question often raised by semanticists who find it inescapable, in this case, to talk about polysemy cheek by jowl with homonymy. Separating the former from the latter is not always discernible, in spite of their apparent dissimilar definitions. A polysymous lexeme conveys more than one given but still, closely or distantly, related meaning: chemin *path* (6/7) 1. In programming, a set of instructions extracted by a computer by executing a routine. 2. In information processing, a logical route in a tree branch. 3. a way in a structured information set. 4. In communication, a link between two network nodes. Here, all the definitions entail the idea of sequence. A different example is agent *agent* (6/7) 1. Software controlling the network traffic. 2. Software seeking for information in databases. 3. Process mediating between the client and the server.

On the other hand, two or more items with distinct unrelated meanings but spelt the same is the case of homonymy. Table 5 includes a typical homonymous example. It could be said that there are two words spelt alike but which carry different unrelated meanings; the first word 'police' is a state organization against law-

violation whereas the second word ‘police’ refers to a particular conception of (printing) symbols.

Probably, homonyms were some time ago different in their written forms, before they finally fused over time as a consequence of sound changes (Cowie, 2013). Compared with homonymy, polysemy is said to be more recurrent and diffuse, a fact that could be sometimes helpful in separating these two above meaning relationships. Creativity is considered as the fountainhead of polysemy providing language with adequacy and significance. According to Cowie (2013) moreover, the advantage of polysemy is twofold:

1. One item widens by acquiring new senses (see 3.1).
2. polysemy proves economical by means of multiplying, still related, meanings in one lexeme. This again facilitates learning through linking prior to schematic knowledge (see 5.2). It is indeed more advantageous to extend what one already knows has than internalise a completely new vocabulary.

5.4. Synonymy

It is a semantic relationship that comprises two or more words with the same meaning. Synonymous lexemes usually share the same grammatical category; a noun is a synonym only of another noun, and verbs can be synonymous among themselves. But, this relationship (synonymy) cannot occur between an adjective and an adverb or between a verb and a noun. An important question, as well, arises: What is synonymy for? Is it really possible to have two words with exactly the same meaning? The answer to the latter question is clear-cut: economy is one crucial aspect of language. There is no

need for multiple words to express a single meaning. One word is enough to convey and correspond to one meaning.

Paradoxically enough, synonymy involves and implies difference too (see Crystal, 1999; Cowie, 2013). The latter could be in language itself in the sense that two, at least, synonymous words belong to two separate varieties of the same language: two standard varieties or one standard variety and the other regional. Another difference is stylistic where synonymous items are divided into ordinary and technical. Collocational difference is still another type; the occurrence of each synonymy member is constrained and determined by the given linguistic context: a specific set of lexical forms carry one specific synonym. On the other hand, the interference of language users' attitudes also may differentiate between synonyms. In the present research, stylistic difference is possibly the most obvious case. 'Gestionnaire' *manager* (6/7), for example, refers in ordinary speech to someone who is responsible for running an organization. However, its technical meaning indicates software designed to deal with the computing tasks of this organization.

5.5. Hyponymy

The meaning of a given lexeme is habitually clarified by virtue of a definition. The structure of many definitions is made of a general word followed by some details and characteristics of the targeted lexeme which is obviously more specific and a kind of. Hyponymic relationships are, in many times, represented in the form of tree diagrams. One word is usually found in the top of

one tree diagram and two or more words compose the bottom of this same diagram. The top-level word is called a superordinate or hypernym while the bottom-level words are hyponyms or more exactly co-hyponyms together. The co-hyponyms in the following diagram illustrate the data at hand. The words *administration* and *transportation* are hypernyms.

Figure 1: A tentative tree diagram for *administration*

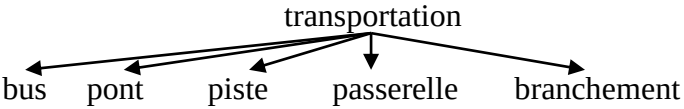

Figure 2: A tentative tree diagram for *transportation*

It is also possible, not in a complete manner, to widen a tree diagram and build a hierarchy with one top-level word and, specific words (co-hyponyms) at several levels. Mid-levels include hypernyms (or superordinate) of lower-level words.

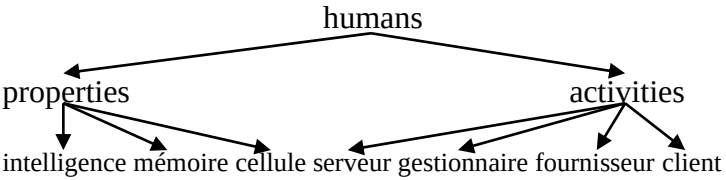

Figure 3: A widened tree diagram for *humans*

An overall picture, in this way, may overcome various learners' difficulties in perceiving the lexical

skeleton of computer science and how certain lexemes come out to convey a certain meaning.

6. Conclusion

In his very early living stage, Man acquires his mother tongue. He grows up later on and his perception of his first language variety also develops and becomes a reflection of identity. Many daily lexemes are common worldwide. They represent some human's prior knowledge without which new knowledge cannot be assimilated. In the Algerian departments of translation, learners may be exposed to translating computer science texts from French into another language, namely English. Computing terminology is new knowledge that could largely be linked to prior knowledge from a semantic point of view. Likewise, three elements which are time, space and energy at least are saved and gained by the translation learner/ teacher.

Notes:

1- Bilingual Encyclopedic Dictionary of Micro-Computing.

2- They occur as a result of shifting between one and another language while speaking (Wales, 2011).

3- Elements (here lexical forms) incorporated into a recipient language (Field, 2002).

4- 14 are English items present in the questionnaire due to their observable frequency simultaneously with the major number of French items.

5- from 4 to 7 out of 7 answered copies of the questionnaire.

6- Unit of lexical meaning interchangeably presently used with word and item.

7- Most of technical definitions are adapted from Dictionnaire encyclopédique bilingue de la micro-informatique (1999) whereas general definitions from Oxford Advanced Learner's

Dictionary (2015) Oxford: Oxford University Press (e-dictionary).
8- *classification*.
9- *graphics theory*.
10- *programming*.
11- *operating system*.
12- *office automation*.

Bibliography

Books

- Cowie, A. P (2013) Semantics. Oxford: Oxford University Press.

- Crystal. D (1999) The Cambridge Encyclopaedia of The English Language. 4th ed. Cambridge: Cambridge University Press.

- Field. F. W (2002) Linguistic Borrowing in Bilingual Contexts. Philadelphia: John Benjamins North America.

- Kramsh.C (2009) Language and Culture. Oxford: Oxford University Press.

- Labed, Z (2013) *The Impact of Computer Science on Computer Scientists' Daily Speech*. In Cahier de linguistique et didactique. n°5. Oran: Dar El Qods.

- Wales. K (2011) A Dictionary of Stylistics. 3rded. New York: Routledge.

- Widdowson. H. G (2011) Discourse Analysis. Oxford: Oxford University Press.

- Yule, G (1998) Pragmatics. Oxford: Oxford University Press.

Dictionaries

- Dictionnaire encyclopédique bilingue de la micro-informatique (1999) France: Microsoft Press.

- Oxford Advanced Learner's Dictionary (2015) Oxford: Oxford University Press.

Appendix: QUESTIONNAIRE

Sexe:	**□ Homme** **□ Femme**
Age :	
Ancienneté professionnelle:	
Spécialité:	
Etablissement de rattachement:	

Il serait très aimable de bien vouloir indiquer les termes que vous utilisez durant la présentation de vos cours/ TDs/TPs en cochant la case correspondante.

Termes	J'utilise	Dans quel module, si oui ?	J'utilise le(s) synonyme(s)	Je n'utilise pas	Je connais mais je n'utilise pas
Abeille	2				2
Accélérateur	2				1
Administrateur	6				1
Adresse	7				0
Agent	6				0
Arbre	7				0
Autoroute	0				2
Bactérie	1				2
Balayer	1				0
Blanc	1				1
Blindé	2				0
Bombe	0				4
Bouchon	4				1
Brain	3				1
Branche	5				0

Branchement	5				0
Bras	1				2
Broche	0				2
Bruit	5				0
Bug	5				0
Bureau	4				2
Bus	5				1
Cavalier	0				3
Cellule	6				1
Certification	5				2
Champ	6				0
Charriot	1				1
Chemin	6				0
Cheval	1				3
Clé	6				1
Client	6				1
Cold	0				0
Comité	2				1
Commande	6				0
Consultant	0				4
Contrat	1				3
Contrôle	3				1
Corbeille	4				2
Corps	4				2
Courrier	5				1
Dépassement	4				0
Dossier	6				1

Drapeau	3				1
Embarquer	4				1
Enfant	3				1
Enveloppe	4				1
Environnement	6				0
Escargot	2				1
Etoile	5				0
Famille	2				2
Fax	1				3
Fenêtre	6				0
Finger	0				2
Fork	1				2
Formulaire	4				2
Fournisseur	6				0
Fusillade	0				2
Gestionnaire	6				0
Gouttière	0				0
Green	2				1
Héritage	7				0
Horloge	7				0
Intelligence	6				1
Intersection	4				2
Invité	5				0
Lecteur	6				0
Manche à balai	0				3
Mémoire	6				0
Migration	4				1

Moteur	4				2
Nappe	0				2
Noire	2				2
Panier	1				2
Parent	5				2
Passerelle	6				1
Pilote	5				0
Pinceau	0				2
Pirate	4				1
Piste	4				3
Plage	5				0
Plateau	0				2
Police	2				3
Pont	5				1
Porte	2				1
Puissance	4				1
Région	3				1
Registre	5				2
Retourner	2				2
Rumeur	1				2
Sauter	1				2
Sécurité	6				1
Serveur	7				0
Shadow	1				1
Signature	5				1
Sommeil	0				2
Souris	4				3

Speech	2				2
Spider	2				2
Stylo	1				3
Table	6				0
Tableau	6				0
Talk	0				2
Tête	3				2
Tortue	0				2
Tour	3				2
Traffic	6				1
Train	0				2
Vie	2				1
Virus	4				3
Voice	0				2
Vue	2				3
Wheel	1				2
Widow	0				0
Window	6				1
Yellow	0				0

Autres commentaires