ON THE LEXICOGRAPHIC TREATMENT OF POLYSEMOUS VERBS IN GREEK-ENGLISH ELECTRONIC DICTIONARIES: THE CASE OF *ΑΝΟΙΓΩ* [ΑΝ'ΙΓΟ]

MARY MARIN
(University of Athens)

ABSTRACT: This paper presents the results of a study whose main objective was to suggest specifications for the creation of a bilingual electronic dictionary for High--School Greek-speaking learners of English that will cater for production needs. More specifically, it discusses the issue of how certain verbs, especially troublesome for high school Greek learners of English, have been dealt with in Greek-English dictionaries. The extent to which four print dictionaries have succeeded in providing and explaining English equivalents of selected verbs is investigated, and five electronic Greek-English dictionaries are evaluated while the microstructure of ανοίγω [an'ιγο] (open, turn on, unfold, spread, dig up etc) is examined in detail in two on--line ones. Since different configurations are required for entries describing verbs, these are illustrated first by pinpointing the weaknesses and omissions of existing print and electronic dictionaries and finally by designing their microstructure for an electronic bilingual dictionary targeted at Greek High School learners mainly for productive use. Finally, the proposed verb entry is presented in detail.

KEYWORDS: learners' dictionaries; print and electronic bilingual lexicography; Corpus Linguistics; lexical databases, verb entry

1. Introduction

A dictionary is considered to be a main element towards producing and understanding a foreign language, in this case English. Electronic dictionaries are a way of encoding all relevant information associated with lexical entries in a manner easily accessible to users. The various types of electronic bilingual dictionaries in the context of English as a foreign language have been examined in the literature, and researchers agree that not a single bilingual dictionary meets 100% of students needs (Cowie, 2000; Koren, 1997; Loucky, 2003; Nielsen and Tarp, 2009; Thompson, 1987; Tono, 1989). The

***Estudos Linguísticos/Linguistic Studies*, 6-7, Edições Colibri/CLUNL, Lisboa, 2012, pp. 245-263**

present work examines some of the issues which are relevant to the construction of a bilingual electronic Greek-English dictionary, aiming to cover the encoding needs of young learners in the target group.

More precisely, the main objective is to suggest specifications for the creation of a bilingual electronic dictionary for high school Greek-speaking learners of English that will cater for the production needs of the specific target group. This can be accomplished by identifying the problems encountered by students of elementary to advanced level of competence in English, compiling comprehensive bilingual databases through research in English and Greek corpora, incorporating all relevant information about grammatical and contextual difficulties, and by selecting examples as revealing as possible for Greek speakers. The verb *ανοίγω [an'ιγο]* has been selected to illustrate this attempt. The entry developed aims at configuring a way to encode all the data in a manner appropriate to users of this age.

2. Literature Review

2.1. Electronic dictionaries

It is an undeniable fact that computer technology has had immense impact on the design and use of a range of dictionaries for language learners. An increasing number of language learners find an electronic dictionary preferable to a printed one because users want their dictionaries to be cheap, complete, portable, comprehensible and easy to use and electronic dictionaries have the advantage of providing their users with almost instant access to a database much larger than a single book. (Nesi, 1999; Chen, 2010). Nevertheless, Rogers (1996: 84) points out that electronic replications of paper-based publications are still "word-based rather than meaning-based" even though they offer better search and retrieval facilities.[1]

Electronic dictionaries can be stored and accessed in a number of different ways. For instance, they can be built or inserted into a hand-held device. A survey by Taylor and Chan (1994) revealed that despite the way that they are marketed as commodities, *hand-held* electronic dictionaries are regarded by their owners as serious learning tools, not just as toys or status symbols. Yet, although look-up is faster, the quality of the information they contain can only be as good as that of the original dictionaries on which they are based, and thus it is inevitable that some will suffer from defects associated with the smaller hard-copy bilingual dictionaries, such as inadequate

[1] She proposes a semantically organized dictionary which would take the user from the definition to the word, and which would deal with such queries as "find me the name of the thing which is a kind of boat and which is flat-bottomed and travels on canals and rivers". Search facilities of this kind are in fact already provided by learners' dictionaries on CD-ROM, although many users are probably unaware of their existence.

coverage, insufficient grammatical, collocational and pragmatic information, and over-simplistic translation.

Alternatively, learners' dictionaries *on floppy disk* or *CD-ROM* also provide more grammar and usage information than hard-copy or hand-held electronic products, because there is space to include grammar and usage volumes in the database. In addition to visual elements that can be accessed directly from their own menus, or by cross-referencing from the dictionary entry, they may also contain audio libraries which provide the user with the option to hear the spoken form of any headword in the dictionary. Moreover, dictionaries on disk allow a certain amount of 'fuzzy' searching which allows the user to locate every occurrence of a word or combination of words within the dictionary, thus retrieving multi-word units, collocations, and groups of similarly-worded definitions.[2]

Currently, the best electronic dictionaries for language learners seem to be those published on websites, which offer storage devices, and retrieval systems; their immense capacity and easy links to other computer-based applications make them a useful learning tool for foreign language students and teachers.

Since the medium in which bilingual dictionaries are presented is one of the elements that determine the selection, organization and representation of information in them, Christina Gelpi (2004) believes that *on-line dictionaries* have to be treated as specific products and goes on to investigate their quality parameters. Among their positive aspects she mentions the easy, quick and cheap access to lexicographical online information, the greater amount of online dictionaries available than printed ones on a diversity of subjects, the simplicity of search systems most on-line dictionaries offer, as well as the introduction of image, sound and video in dictionary entries allowed by multimedia resources. Most importantly, the absence of space restrictions allows the lack of homogeneity and compression that exists in printed dictionaries. Unfortunately, as Gelpi (2004: 10) stresses, "not all on--line bilingual dictionaries are really designed as on-line products. Most of them are digitized products, or just transformed Word documents, without any consideration for digital resources and possibilities".

2.2. The pedagogical value of electronic learners' dictionaries

The pedagogic dictionary has recently been more widely used as an educational aid and a learning tool. Nevertheless, Brumfit (1985) claims that quite often the dictionary is taken for granted and under-utilized. In a recent

---

2 Unfortunately, searches of the A-Z dictionary often extract entries that are not linked by meaning; the same words are repeated many times within the full text, and a combination of search terms will often co-occur within the same entry, not in collocation, but in totally unconnected example sentences.

study on dictionary reference skills in higher education, Nesi comes to a similar conclusion: most foreign language students at British universities have no dictionary skills and "don't in general ever use monolingual dictionaries. They use bilingual ones badly" (1999: 65). This is even truer for electronic dictionaries which have only been available for a few years and whose use has been investigated in only a few research studies so far (Guillot & Kenning, 1994; Sharpe, 1995; Nesi, 2000).

Although the comments of hand-held dictionary owners suggest that learners appreciate the speed and ease of electronic lookup, it is not known whether fast searching is really advantageous to the learning process. According to Sharpe (1995: 50) some teachers of Japanese have expressed fears that learners will not retain the information they retrieve so quickly and so painlessly. In support of the pedagogical value of electronic dictionary use, however, Guillot and Kenning (1994) write of their students' "increased capacity for sustained effort" when using the Robert Electronique[3]. They found that the accessibility of computer-based dictionary entries encouraged browsing, and hence vocabulary acquisition: students spontaneously looked up a large number of unknown or unclear words, not just in cases where the task made it necessary, but also simply out of curiosity, they subsequently commented on how easy and satisfying it was to do so, and added that they would never have done it to anything like the same extent with a printed dictionary, if at all (Guillot and Kenning, 1994: 65).

The pedagogical potential of electronic dictionaries is too great to be ignored, even by institutions with few resources. A single CD-ROM on a single computer can provide a huge amount of classroom material, while the provision of dictionaries on the Internet may in time make it unnecessary to install local area networks, or trust CD-ROM disks to individual learners. A number of on-line dictionaries are already available on the World Wide Web[4]. Meijs (1992: 152) foretells "the imminent demise of the dictionary as a book. In a decade or so, on-line dictionaries on disk or CD-ROM will no doubt be the norm rather than the exception". Many readers will doubt the veracity of this prediction, yet the present pace of technological change is

---

3 In 2002 *Dictionnaires Le Robert* produced a new bilingual dictionary designed for pre--intermediate learners of English, the *Junior Bilingue* (since renamed First in English). Unlike most standard bilingual dictionaries available in France, it is asymmetrical (the "encoding" and "decoding" sides are presented in different ways) and designed specifically for French people learning English (i.e., all the metalanguage is in French and the text is built around known problems encountered by learners).

4 For an Index of On-line Dictionaries, see: http://www.yourdictionary.com or http://www.onelook.com for English MLD, while http://www.bucknell.edu/"rbeard/diction.html refers the user to more than 2,000 dictionaries in more than 260 languages and more than 150 specialized fields. In addition, http://www.lexicool.com is a directory of "all" the online bilingual and multilingual dictionaries and glossaries freely available on the Internet.

bewilderingly fast, and electronic learners' dictionaries seem already to be on the way to becoming a preferred alternative to the 'fat' dictionary in print.

3. Research Methodology

The methodological procedure comprised both qualitative and quantitative criteria: qualitative, in that it included an investigation into the needs and pre-existing skills of the target group, as well as the content and structure of the lemmas as presented in print and electronic bilingual dictionaries, but also quantitative for it not only took into account the frequency of verbs used in Greek and EFL educational material and the nature of errors made by students in EFL exams but also made use of the corpora to provide frequencies and enhance senses and examples.

3.1. Target User Specifications

In order to enhance the quality of a dictionary, it is necessary to take the target users' needs and reference skills into account. For the purposes of this study, a representative sample of 388 high school students of various levels (elementary to advanced) were tested in relation to some of the most troublesome and frequently tested verbs in EFL exams. In order to ensure representativeness, significant effort was made to use a balanced body of students in terms of level which was determined according to the coursebook they were taught in their English class. Figure 1 shows the distribution of levels of competence of the participants in the written test.

Apart from free production (essays produced in the classroom environment), guided and controlled activities were also evaluated: translation, multiple choice and gap-filling exercises during which students were encouraged to use electronic dictionaries. The time allocated for the completion of the test was 15-20 minutes according to the level, which was viewed as adequate considering the length of the test and the amount of structures that learners were asked to produce.

False-beginners (7%) and elementary level (11%) students produced rather poor results especially in reference to morphology (inflection of verbs), grammar (tenses) and syntax (structure and prepositions). The majority of intermediate (17%) and upper-intermediate (24%) students produced fairly competent responses, particularly with regard to tenses and recognition of fixed expressions or idioms. As far as translation was concerned, word order issues were evident, as many students failed to follow the rules of English syntax, and kept the order of the Greek words, as they found them in the source text.

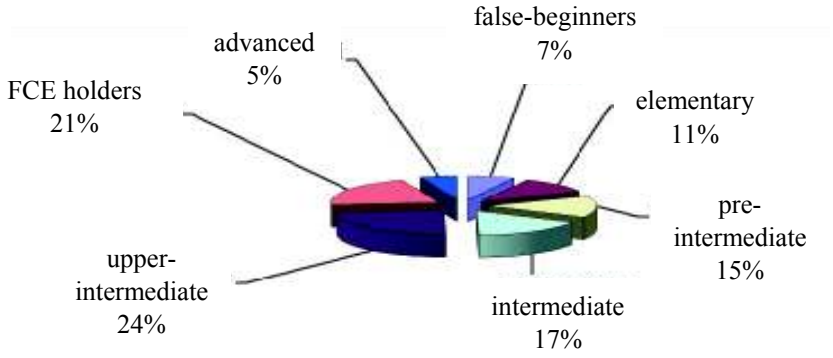

Figure 1: Level of competency of test participants

The verb *ανοίγω* [an'ιγο] presented more problems among lower levels. With the exception of «ανοίγω τρύπα», which was successfully translated as "*dig (up)* a hole", only 25% of elementary and pre-intermediate students could distinguish among *"set up"* and *"open up"*. Although the percentage of finding the right translational equivalent increased as the level got higher (40% among intermediate and upper-intermediate and 83% among advanced level students), equivalents such as "*undo* (the zipper)" «ανοίγω το φερμουάρ» and "*unfold* (the map)" «ανοίγω το χάρτη» were unknown even to higher levels. One would expect a certain ease at least in the recognition of *"turn on* the tap" for «ανοίγω τη βρύση» but even this one proved confusing. Equivalents such as "(the weather) *clears up*" and "(flowers) *blossom*" had been taught only to students sitting for exams, but once again the score was low (45%).

The evaluation of results combined with a comparison of the microstructure of these verbs in monolingual and bilingual print and electronic dictionaries, revealed potential areas of improvement in the design of the dictionary entries mainly in terms of organization of the lemmas, enhancement of the definitions and enrichment of examples in order to maximize lexical coverage and grammatical information.

3.2. The verb entry in 4 print Greek-English Dictionaries

The microstructure of five polysemous verbs, αφήνω (let/leave/allow etc), ανοίγω (open/turn on/unfold etc), κλέβω (rob/steal etc), ρίχνω (throw, drop etc) and χτυπώ (hit/beat/knock etc) was examined in four print bilingual (Greek-English) learners' dictionaries and evaluated in terms of their components. The dictionaries are: a) COLLINS – A. BETSIS ELT (2007)

b) OXFORD – D.N.STAVROPOULOS (2005)

c) RIZOS – GREEK-ENGLISH DICTIONARY (2004)

d) JUNIOR FYTRAKIS (1998) targeted at school learners in the first years of English, which fits the profile of our target user to a great extent.

According to Back (2005), the dictionary entry designed for encoding purposes should provide all the metalinguistic information in the mother tongue, which is practised only by Collins and Fytrakis, since the metalanguage in Oxford and Rizos is English.

1. None of the dictionaries under study includes phonetic transcription of the English equivalents, essential for EFL learners.
2. No inflected forms are given for the English verbs, not even the irregular ones. Oxford-Stavropoulos, cross-refers the user to a list of tables of conjugation examples of Greek verbs at the back of the dictionary.
3. The only grammatical information provided is that of transitivity / intransitivity given in abbreviated form, not in the mother tongue except in Collins. Junior Fytrakis does not provide any such information.
4. Unfortunately, in none of the entries under study is the grammatical or syntactical behaviour of the verbs explicitly or contextually indicated.
5. Typical collocations are given systematically in Collins (only in Greek) and in Oxford (in both languages) but these are very rarely contextualized.
6. In print dictionaries whole illustrative examples are rare, because of space constraints. Rizos gives partial sentences or edit corpus-based examples. In Collins they are practically non-existent, whereas in Oxford--Stavropoulos, they are short and and do not provide enough context.
7. Finally, none of the dictionaries under study employ usage notes.

3.3. Performance evaluation of Greek-English electronic dictionaries

The bilingual dictionaries circulating in Greece belong to the Desk and Pocket categories, and in nine times out of ten, the second language is English. Very few belong to the electronic type and of these some are available on purchase either with their print version or as stand-alone products or on--line. They are designed mainly for professionals and amateurs having basic needs for translations, but they hardly meet the users' demands.[5]

The most popular electronic English-Greek & Greek-English dictionary in the market is MAGENTA[6], which includes more than 370.000 words, phrases and idioms, including the great thesaurus of the Greek language with more than 90.000 synonyms. Both MAGENTA (hence referred to as MG) and its improved descendant GOLDEN VERSION (GV) are available on CD-ROM but can also be accessed on line or downloaded. GV was selected for study

5 On account of the limited possibilities of the local market, "the writing of bilingual dictionaries is done in a more or less haphazard way, […] and in most cases the result is the production of bilingual dictionaries that leave much to be desired". (Tsampounaras, 2001).

6 MAGENTA on line: http://www.in.gr/DICTIONARY/lookup.asp?word

not only because of the significant number of improvements since 1995, in the content as well as the interface, but also because it is an electronic version of the dictionary in print format. GEORGAKAS[7] dictionary (GE) is only available on-line and although still incomplete, is the fullest of electronic products in terms of microstructure. KYPROS (KY)[8] is free on-line, while LINGVOSOFT (LS)[9] is a commercial product typical of quick-access 'self--proclaimed' user-friendly products.

Three points of interest have been compared, regarding retrieval power, performance evaluation and user-friendliness. Firstly, strengths and weaknesses in look-up routes are evaluated within each single dictionary plan and design frame.

Generally, in all five EDs under study, the search procedure is comparatively very easy. If the learner needs to translate any word, he/she writes it down and the application will automatically recognize it as Greek or English giving as result the translations in the target language. On the left of the window the words matching the given one are displayed and on the right, the translations are found. Nevertheless, GE does not recognize inflected forms or complex words, whereas LINGVOSOFT produces no results for *ανοίγω* (open, unfold, spread, switch on etc) alone. (Figure 2)

Figure 2: Search results for the entry *ανοίγω για* (open to) in LINGVOSOFT

7 GEORGAKAS ON-LINE http://www.komvos.edu.gr/dictionaries/dictonline/DictOnLineGeo.htm

8 KYPROS-NET http://www.kypros.org

9 LINGVOSOFT http://www.lingvosoft.com

KY and LS give the closest match instead. For example, when the user presses the past tense/anikse/, he/she gets a choice between: *he opened the window* and the homonym *άνοιξη* /aniksi/(spring)

Obviously, despite the ambitious search capabilities advertised by the publishers, one look at the microstructure of the headword ανοίγω in KYPROS-net reveals a great number of inefficiencies: among others, few equivalents, (only 10), cross-reference to other headwords, total lack of example sentences or grammatical and syntactic information. In addition, most products may allow the user to copy, but not print or export list of words corresponding to a search. All dictionaries but GE have a drop-down list. Only MG and GV offer phonetic transcription.

Most importantly, grammatical tags, inflectional paradigms, frequency mark-up, usage, specific field domains are, with the exception of MG products, not offered in the EDs under study. In conclusion, none of the above mentioned EDs cover the needs of the Greek learner 100%.

3.4. The microstructure of the verb *ανοίγω* in two on-line EDs

Studying the search results for the verb *ανοίγω* in the two most comprehensive on-line electronic dictionaries GEORGAKAS[10] and MAGENTA[11] the following remarks are to be made:

The former follows the microstructure of a Greek monolingual dictionary[12] providing a phonetic transcription for the Greek headword [an'ιγο] and including the etymological information at the end. However, it fails to do the same for the English equivalents nor does it provide any inflected forms for either SL or TL. It distinguishes 11 senses of the verb based on its transitive--intransitive structure and 3 senses as intransitive alone. The metalanguage is English and the grammatical information is given in semi-abbreviated forms (trans., intr.) but the coding is rather confusing for the user: e.g. (intr act. & mediop ανοίγω and ανοίγομαι). It provides synonyms in the SL (Greek) and is clearly corpus-based. This is obvious in the citations / quotes of famous words of literature, provided unedited and unabridged and accompanied by the name of the author.[13] The microstructure of the lemma is apparently designed for both receptive and productive use by a non-native speaker of

10 http://www.komvos.edu.gr/dictionaries/dictonline/DictOnLineGeo.htm

11 http://www.in.gr/dictionary/lookup.asp?Word

12 ΛΚΝ: Λεξικό της Κοινής Νεοελληνικής. Ίδρυμα Μανώλη Τριανταφυλλίδη. (1998) Θεσσαλονίκη: Ινστιτούτο Νεοελληνικών Σπουδών: http://www.komvos.edu.gr/dictionaries/dictonline/DictOnLineTri.htm

13 from **ανοίγω**: **(8)** cause sth to acquire leaves or flowers poem μου 'θρεψε ο ήλιος το κορμί και τ' άνοιξε σαν άνθος (Palam) | intr grow leaves or petals, be in flower, blossom (syn φυλλορροώ or ανθοφορώ).άνοιξαν τ' αμπέλια | το κλήμα είναι ανοιγμένο | folks. τώρα 'ναι Μάης κι άνοιξη κι ανοίγει το ζουμπούλι (Theros) | poem άνοιξε, νυχτολούλουδο, | άνοιξε και μη κλείσεις (Valaor)

Greek. To this end, it is extremely comprehensive in terms of lexical content albeit no syntactic information except transitivity/intransitivity marker is given, and this is one of its major differences with all the other electronic dictionaries. Nevertheless, its density does not make up for versatility as the learner has to read his/her way through the right equivalent. Therefore, user--friendliness is compromised and this affects overall performance and flexibility options. The user cannot navigate through the lemma, unless he/she reads it in detail, and the query possibilities are confined to canonical forms, that is, the search option does not recognize inflected forms of the verb such as *ανοίξαμε* (we opened) nor multi-word expressions. It is targeted at educated adults and is hardly appropriate for students.

On the other hand, Magenta is supposedly designed to be 'user--friendly': The instructions are in Greek and by pressing the appropriate keystroke, the application asks for the key-word and gives the corresponding translations. (Figure 3) The search for *ανοίγω* came up with no less than 84 phrases with their translational equivalent. Unfortunately, the application cannot produce more than 10 expressions / one page of results at the time, alphabetically listed, nor does it display a pop-up list with all the possible prompts; therefore, the user has to renew the page 9 times to reach the last set of expressions. This method, despite its speed, is rather user-unfriendly and unreliable, taking into account the fact that all 84 'solutions' are accompanied by a cross-reference to another headword. In addition there are equivalents that are just cited without any mention of collocator (e.g: *ανοίγω περισσότερο* (open more) = *Δείτε επίσης* (See also): dilate). Finally, neither grammatical / syntactic information nor any examples are given anywhere in the dictionary.

It is obvious that electronic lexicography in Greece leaves much to be desired and significant improvements have to be made mainly in terms of the organisation of the lemmas, enhancement of the definitions and enrichment of examples in order to maximize lexical coverage and grammatical information. This can be accomplished initially through careful research in the corpora and the compilation of well-informed databases.

3.5. Compilation of the bilingual database

The first methodological step towards this end was the collection of examples from both languages. The inter-related, inter-compatible examples were compared and contrasted to create rich Greek-English databases particularly sensitive to the degrees of equivalence between the two languages. The databases were empirically motivated as they were corpus-driven; Corpus-enquiry software, "operating on large volumes of data, is very efficient at revealing the regular features of a language" (Rundell, 2008). First, instances of usage and collocational restrictions were observed in Word sketch, senses were identified in concordance lines (Figure 4) retrieved from

the (HNC) "Hellenic National Corpus" and the (BNC) "British National Corpus"[14] for Modern Greek and English respectively, in order not only to identify the meaning of each headword, but also to determine its combinational behaviour: phraseology, patterns of complementation, collocational and contextual preferences, and all data were saved in two different files, one for each language, to inform the bilingual databases.

Parts of the database entries were selected to exemplify the templates and build the entry for the proposed electronic learners' dictionary.

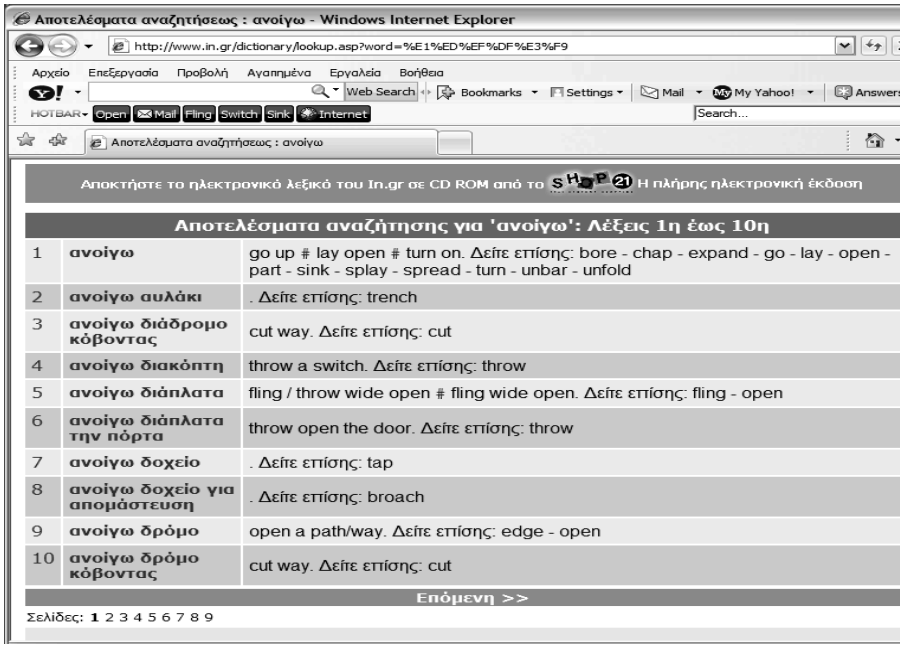

Figure 3: Search results for the entry ανοίγω in the on-line version of MAGENTA

[14] British National Corpus (BNC). (2008). <http://www.sketchengine.co.uk/auth/corpora/run.cgi/first_form?corpname=preloaded/bn Hellenic National Corpus (HNC). 2008. <http://hnc.ilsp.gr> GkWAC:http://beta.sketchengine.co.uk/auth/corpora/run.cgi/first_form?corpname=preoaded/gkwac

Corpus: **GkWaC**

Hits: **34386**

aw ord,[w ord="(?	=doc.id	
λεπτά περίπου. Ύστερα	**ανοίγουμε**	και βράζουμε λίγο ακόμα **UNSEAL**
για 20΄ λεπτά περίπου. 4.	**Ανοίγουμε**	την χύτρα και προσθέτουμε
(Βλέπετε Σχήμα 7). Όταν	**ανοίγετε**	το ΣΥΡΤΑΡΙ ΜΕ ΤΙΣ ΘΗΚΕΣ **DRAW**
στα ντουλάπια για να μην	**ανοίγουν**	εύκολα. Δέστε τον θερμοσίφωνα
μόνο τεχνικός μπορεί να	**ανοίξει**	πάλι την παροχή του γκαζιού **TURN ON**
στα ντουλάπια για να μην	**ανοίγουν**	εύκολα. Δέστε τον θερμοσίφωνα
σημείο του Ασκληπιείου	**ανοίγεται**	μπροστά και απέναντι **SPREAD**
Oxford Credit (UK) PLC " που το 1997	**άνοιξε**	υποκαταστήματα στην Κατερίνη **OPEN A STORE**
Αγγλικής τραπέζης που θα	**άνοιγε**	κατάστημα στην Κατερίνη / **START A BUSINESS**
Βορείου Ελλάδας. Το 1997,	**άνοιξαν**	πράγματι πολυτελή γραφεία
κόσμος της περιοχής για να	**ανοίξει**	λογαριασμούς στη νέα **OPEN AN ACCOUNT**
επιταγών σε όσους είχαν	**ανοίξει**	λογαριασμούς όψεως. </*p*>
πελάτη. Ανύποπτος ο Μανόλης	**άνοιξε**	ένα λογαριασμό ταμιευτηρίου
</*p*><*p*> Η αγαπητή μου fou-lianna	**άνοιξε**	τον χορό για ένα blogame που **START**
ΤΗΣ ΑΝΑΤΟΛΙΚΗΣ ΚΡΗΤΗΣ	**άνοιξε**	την Παρασκευή το βράδυ
φτάνει το νερό και έτσι να	**ανοιχτούν**	φρέατα και να γίνουν δεξαμενές **DIG UP A HOLE**
της πόλης στην ομάδα, τον	**ανοίγει**	και διαβάζει την ιστορία
βάσεις στην Τουρκία δεν θα	**ανοίξουν**	τόσο εύκολα. Η κυβέρνηση **OPEN BORDER**
ουλα στο σφυρι εψες τσε	**ανοιξαμε**	πανια για τον αδη τσε **SAIL**

Lexical Computing Ltd.
Sketch Engine (ver:SkE-2.31-2.59.3)

Figure 4: First page of Concordances from Sketch Engine results for *ανοίγω*

The theoretical frameworks that informed the databases were frame semantics (Fillmore, 1985; Fillmore & Atkins, 1992), cognitive semantics (Lakoff & Johnson, 1980), as well as the contextual theory of meaning and corpus linguistics (Firth, 1957; Sinclair, 1991, 2003).

More specifically, in order to ascertain that all corpus data were systematically and objectively analysed and that all relevant features of the headword were included in the database, the Frame Semantics approach was applied. Drawing on Atkins (1996), Atkins and Rundell (2008) and Mel'čuk's (1998) theory of lexical functions and collocational patterns, first, the frame was defined, and its 'core' elements were named and described. Then, a list of all the words that evoke that frame in one of their senses was made. Next, for each sense or LU (Lexical Unit) a set of corpus sentences was extracted, each sentence was annotated by marking off its FE (Frame Elements) and for

each frame the phrase types (NP, PP, VP) and its grammatical functions (subject, object, complements, etc.).

An invaluable contribution towards the semantic analysis of each verb including their metaphorical and idiomatic instances proved to be the Cognitive semantics approach (Lakoff & Johnson, 1980), which by adopting the position that the conventional meanings associated with words and other linguistic units are seen as relating to thoughts and ideas, therefore semantic structure is conceptual structure, allowed for cross-linguistic comparisons.

Next, a style Guide was designed to ensure proportioned coverage of lexical and grammatical information in the combined bilingual database. Examples were collected for each LU (lexical unit) and translated or paralleled with their English equivalents. (Figure 5)

LU 1	MEANING	to render free of access; to unclose; to unbar
	GRAMMAR	TRANSITIVE
	FRAME	CLOSURE
	CONCEPTUAL ROLES/COLLOCATES	*AGENT: human* *ENCLOSED_REGION:* a) στόμα, μάτια, πόρτα, παράθυρο, δρόμο, σύνορα b) κουρτίνα, αυλάκια
	MODIFIER	διάπλατα=**wide open** απότομα= **fling (flang, flung) open** **throw (threw, thrown) open**
TRANSL. EQUIVALENTS		**a) open, unlock, get (got, got), answer** *(the door)* **b) draw (drew, drawn)** *(the curtain-s)*
EXAMPLE		Άνοιξε την πόρτα του αυτοκινήτου
TRANSLATION		He **opened** the car *door*.
EXAMPLE		Δε θα ανοίξει κανείς την πόρτα;
TRANSLATION		Won't any body **get/ answer** the **door**?
EXAMPLE		Πότε άνοιξε η χώρα τα σύνορά της;
TRANSLATION		When did the country **open** its **borders**?
EXAMPLE		Ο δρόμος θα ξαναν**οιχτεί** σε λίγες ώρες αφού η αστυνομία τον ελευθερώσει (από τα οχήματα).
TRANSLATION		The **road** will be **opened** again in a few hours after police have cleared it.
EXAMPLE		Άνοιξε τις κουρτίνες
TRANSLATION		He **drew** *the curtains*.

LU2	MEANING	to remove any fastening, wrapping or covering from in order to reveal the content; to cause to become loose; to release
	GRAMMAR	TRANSITIVE
	FRAME	CLOSURE
	CONCEPTUAL ROLES/COLLOCATES	*AGENT: human* *CONTAINING_OBJECT:* containers κουτί, ντουλάπι, πακέτο, δέμα, μπουκάλι, συρτάρι
TRANSL. EQUIVALENTS		**uncork** *(a bottle)*, **undo (undid, undone)**, **unseal** *(a letter, an envelope)*, **tear (tore, torn) open, unwrap**
EXAMPLE		Άνοιξε το καπάκι
TRANSLATION		He **undid** the *lid*.
EXAMPLE		Ανοίξαμε σαμπάνια.
TRANSLATION		We opened / **uncorked** *a bottle* of champagne.
EXAMPLE		Άνοιξε το γράμμα.
TRANSLATION		He **unsealed** / opened the *envelope* / he tore the envelope **open**.
EXAMPLE		Άνοιξε το δέμα.
TRANSLATION		**Undo** the *parcel*.
EXAMPLE		Άνοιξε το μπουκάλι και έβαλε προσεχτικά μπράντυ στα ποτήρια.
TRANSLATION		He **uncorked** *the bottle* and carefully poured the Brandy into the glasses.
EXAMPLE		Μην ανοίξεις βαλίτσες ακόμη!
TRANSLATION		Don't start **unpacking** yet!

Figure 5: Extract from the bilingual database for the verb *ανοίγω*

3.5. Editing the entry

One important consideration in dictionary-making has been that of space. While space is scarce in print lexicons, it is an abundant resource in online ones. This is because digital storage media are extremely efficient for storing immense amounts of text information. It has to be remembered that the aim of an electronic lexicon is different from that of printed dictionaries.

The entries of an electronic lexicon, for example, should comfortably contain all orthographical or inflectional variations. There is abundant space for example sentences and usage notes. In addition, as Chon (2008) observes, users of electronic dictionaries no longer have problems with alphabetic search (Koren, 1997; Scholfield, 1982) which is a prerequisite for use of print-type dictionaries, or with dictionary metalanguage, e.g. for syntactic pattern and grammar codes, or abbreviations and acronyms. (cf. Neubach and Cohen, 1988; Tomaszczyk, 1979)

Furthermore, the grammatical categories of the source-language vocabulary and its corresponding translations should be consistent. To this end, a template verb entry and the dictionary Style Guide were subsequently designed.

4. Model Entry for *ανοίγω*

As one can observe in the suggested model entry (Figures 6a & 6b) the target language (English) equivalents are given for headwords, derived forms and examples, and the *metalanguage* is L1 (Greek).[15]

Pronunciation is not transcribed but the user can hear the canonical form (infinitive) of each equivalent by pressing the icon ( ) next to the word.

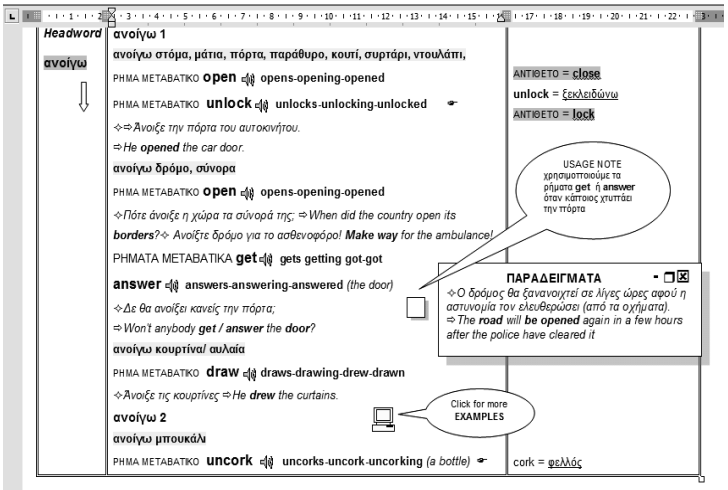

Figure 6a: First page of Model Entry for *ανοίγω*

15 "With a monolingual, the student is forced to use the foreign language in order to understand it, and there is of course no guarantee that the definitions, examples (glossed or unglossed) or metalanguage notes are comprehensible. In the case of a bilingual, however, […] the student uses L1 in order to understand L2" (Atkins 2002: 21)

Senses are highlighted, marked by numbers (1, 2, 3…) discriminated not alphabetically but by collocational restrictions, and information about combinational properties is illustrated by examples of usage. Online versions of print dictionaries no longer have any compelling reason to use abbreviations. In this model of electronic entry, no abbreviations have been used.

Grammar: All verbs are marked for transitivity (ΡΗΜΑ ΜΕΤΑΒΑΤΙΚΟ/ ΑΜΕΤΑΒΑΤΟ). If a verb pattern is found more frequently in the Passive Voice, the equivalent is labelled (συνήθως ΠΑΘΗΤΙΚΗ ΦΩΝΗ/ κυρίως στην ΕΝΕΡΓΗΤΙΚΗ).

The hand symbol (☞) refers the user to a second column on the right, where more information on verb structure is given highlighted. The presence of a *second column* means that information that is implicit in standard dictionaries can be made explicit for the learner. Derivatives are also provided.

In a user-friendly online lexicon it would be useful to offer a more expanded sample of the *inflection* of the translational equivalents. Verb basic forms (infinitive, 3rd person Present, present participle, Past Tense, Past Participle) are given for all verbs (both regular and irregular)

Translational equivalents are given for every sense in bold letters. If there is a multiple meaning of some entry words, partial equivalents of the target language should be given.

Usage notes are used consistently throughout the entries. They provide insightful guidance on confusing pairs of words and appear either in a separate box or in different colour in the right column.

Significant collocates are highlighted and modifiers are given next to the verb in the extra column. If problems in use arise for the user, there are cross references to an extra usage notes box, which pops up by clicking on the icon.

The *example sentences* are designed to emphasize points relating to the headword equivalent which students need to understand and learn. They are authentic and corpus-based aiming above all to generate a translation that shows the headword equivalent in action. It is useful to give more example sentences than are common in print dictionaries. Therefore, more examples can be retrieved by clicking on a computer icon.

The *style/register level* of equivalents should be the same in both languages. Formal and informal uses are marked (ΕΠΙΣΗΜΟ) and (ΑΝΕΠΙΣΗΜΟ) or (ΛΑΙΚΟ) respectively, while figurative meaning is marked (ΜΕΤΑΦΟΡΙΚΗ ΣΗΜΑΣΙΑ).

The *usage notes* are inserted in boxes with a (▪ minimization ❒maximization ☒close function), cross referred to from words or example sentences by clicking on a box ❒ icon. Occasional illustrations (pictures and photographs) accompany some of the senses.

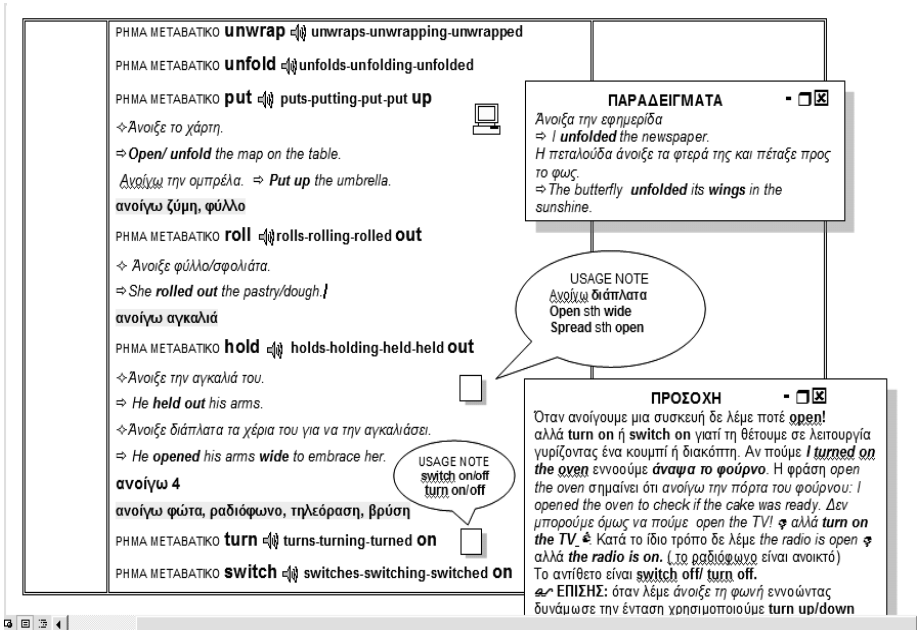

Figure 6b: Third page of Model Entry for *ανοίγω*

5. Conclusions

Taking into account the target user's needs and skills and in the light of the new possibilities offered by the electronic medium – namely the absence of space constraints, I believe that the entries should contain all inflectional variations, collocational restrictions, be accompanied by a sufficient number of illustrative corpus-based examples and grammatical indications to show the entry word's paradigm in an explicit and detailed way. To this end, usage notes are deemed an essential component of the microstructure. Furthermore, the grammatical categories of the source-language vocabulary and its corresponding translations should be consistent.

Subsequent research could have a focus similar to this one by examining the cases that fell outside the scope of the present study. It would therefore be interesting to replicate this study, not only by testing the informed database with the initial group of students or to expand the present research for a larger number of verbs, or groups of verbs sharing common features, such as verbs of motion, perception and cognition as well as nouns and adjectives. In addition, the entries could be designed to cater for other target groups, such as primary school pupils or adult students with academic needs.

The implication of the study is that the constructed databases and their methodological design can serve as a model for the development of an ex-

tended bilingual lexical resource for the language pair Greek – English, to be used (and reused) by lexicographers writing various types of dictionaries.

In conclusion, facing all the work that remains to be done in order to inform more bilingual databases, to configure the templates for the dictionary, eventually design a greater number of model entries, complete with usage notes, and perhaps, ultimately, implementing all the suggested interface features into a marketable electronic product, I consider thorough research and practical utilization of corpora of decisive importance. Feedback from the users as well as cooperation between information technology experts and lexicographers may lead to the improvement of existing e-dictionaries or the design of an effective ED for learners, catering not only for their encoding needs, as suggested in this study, but also for their decoding ones.

References

Atkins, B.T.S. (1996) Bilingual Dictionaries: past, present and future. In: *EURALEX '96 Proceedings 1, (eds.) M.Gellerstam, J.Jarborg, S-G. Malmgren, K. Noren, L.Rogstorm & C.Rojder Papmehl.* Goteborg: Department of Swedish, Goteborg University, pp. 515-546.

Atkins, B.T.S. 2002. Then and now: competence and performance in 35 years of lexicography. In. Braasch, A. . & C..Povlsen, (eds), *Proceedings of the Tenth EURALEX International Congress, EURALEX 2002*. Copenhagen:Center for Sprogteknologi, pp. 1-28.

Atkins, B.T.S. & Rundell, M. 2008. *The Oxford Guide to Practical Lexicography,* Oxford University Press 2008

Back, M. 2005. Bilingual Dictionaries for Learners. In *Kernerman Dictionary News*, Number 13, June 2005 retrieved on 16/7/2011 from http://kdictionaries.com/kdn/kdn1310.html

Brumfit, C. J. 1985. Preface to R. Ilson (Ed.), *Dictionaries, Lexicography and Language Learning*. Oxford: Pergamon Press in Association with the British Council.

Chen, Y. 2010. Dictionary Use and EFL Learning. A Contrastive Study of Pocket Electronic Dictionaries and Paper Dictionaries. *International Journal of Lexicography* (2010) 23(3): 275-306, retrieved on 16/7/2011 from http://ijl.oxfordjournals.org/

Chon, V. 2008. The Electronic Dictionary for Writing: A Solution or a Problem? *International Journal of Lexicography* (2009) 22(1): 23-54 first published online September 11, 2008 retrieved on 16/7/2011 from http://ijl.oxfordjournals.org/

Cowie, A.P. 2000. The EFL dictionary pioneers and their legacies. Kernerman Dictionary News.retrieved on 16/7/2011 from http://www.kdictionaries.com/newsletter/kdn8-1.html

Fillmore, C.J. 1985. Frames and the semantics of understanding. *Quaderni di Semantica* Vol. 6, No. 2, pp. 222-retrieved on 17/6/2011 from http://www.icsi.berkeley.edu/pubs/ai/framesand85.pdf

Fillmore, C.J. & Atkins, B. T. S. 1992. Toward a frame-based lexicon: The semantics of RISK and its neighbors. In A. Lehrer & E. F. Kittay (eds.), *Frames, Fields, and Contrasts.* Hillsdale, New Jersey: Lawrence Erlbaum Associates, pp. 75-102.

Firth, R. 1957. *Papers in Linguistics 1934-1951*. London: Oxford University Press.

Gelpi, C. 2004. Reliability of online bilingual dictionaries. In *Dictionary Visions, Research and Practice. Selected papers from the 12th International Symposium on Lexicography,* Copenhagen 2004 (Vol. 4: 2-12) Gotlieb, H & Mogensen, J.E. (ed.)

Guillot, M.-N. and Kenning, M.-M.1994. Electronic monolingual dictionaries as language learning aids: a case study. Published in*: Computers & Education – Special issue: emancipation through learning technology – selected papers from the EUROCALL '93 conference* Volume 23 Issue 1-2, Aug./Sept. 1994, pp. 63-74

Koren, S. 1997. Quality versus convenience: Comparison of modern dictionaries from theresearcher's,teacher's and learner's points of view. TESL-EJ,2(3). Retrieved on 10/7/2011from http://tesl-ej.org/ej07/a2.html

Lakoff, G. & Johnson, M. 1980. *Metaphors we live by.* Chicago: University of Chicago Press.

Loucky, J.P. 2003. Using Computerized Bilingual Dictionaries to Help Maximize English Vocabulary Learning at Japanese Colleges. *CALICO Journal, 21 (1),* pp. 105-129. Retrieved on 10/7/2011 from

https://calico.org/html/article_284.pdf

Meijs, W. 1992. Computers and Dictionaries. In. C. Butler (ed.), *Computers and Written Texts.* Oxford: Blackwell, pp. 141-65.

Mel'čuk, I. 1998. Collocations and Lexical Functions. In. A.P. Cowie (ed.), *Phraseology, Theory, Analysis and Applications*. Oxford: Clarendon Press, pp. 23--53

Nesi, H. 1999. A user's guide to electronic dictionaries for language learners. *International Journal of Lexicography,* 12 (1): 55–66. Retrieved on 17/6/2011 from http://ijl.oxfordjournals.org/

Nesi, H. 2000. On screen or in print? Students' use of a learner's dictionary on CD--ROM and in book form. In P. Howarth and R. Hetherington (Eds.) EAP University Press.

Neubach, A. & Cohen, A.D. 1988. Processing Strategies and Problems Encountered in the Use of Dictionaries. *Journal of the Dictionary Society of North America,* 10, pp. 1-19.

Nielsen, S. And Tarp, S. (eds.) 2009. *Lexicography in the 21st Century. In honour of Henning Bergenholtz.* Amsterdam: John Benjamins Publishing Company.

Rogers, M. 1996. Beyond the dictionary: the translator, the L2 learner and the computer. In. G. Anderman & M. Rogers (eds.), *Words, Words, Words: the Translator and the Language Learner.* Clevedon: Multilingual Matters, pp. 69-95.

Scholfield, P. J. 1999. 'Dictionary use in reception.' *International Journal of Lexicography* 12, pp. 13-35.

Sharpe, P. 1995. Electronic dictionaries with particular reference to the design of an electronic bilingual dictionary for English-speaking learners of Japanese. *International Journal of Lexicography* 8 (1), pp. 39-54.

Sinclair, J.M. 1991. *Corpus, Concordance, Collocation.* Oxford: Oxford University

Sinclair, J.M. 2003. Corpora for Lexicography, in Van Sterkenburg 2003, pp. 167--178

Taylor, A. & A. Chan. 1994. Pocket electronic dictionaries and their use. In: *EURALEX '94 Proceedings,* (eds.) Martin, W., W.Mejis, M.Moerland, E. ten Pas, P. van Sterkenburg & P.Vossen, Amsterdam: Vrije Universiteit, pp. 598--606.

Thompson, G. 1987. Using bilingual dictionaries. *ELT Journal,* 41/4, pp. 282-286.

Tsampounaras, P. E. 2001. Bilingual lexicography in Greece. In *Translatum Journal and the Author* ISSUE 1 – June 2001 URL: http://www.translatum.gr/journal /1/tsam1.htm accessed 10/7/2011

Tomaszczyk, J. 1979. Dictionaries: Users and Uses. *Glottodidactica* 12, pp. 103--119.

Tono, Y. 1989. Can a Dictionary Help One Read Better? *On the Relationship between E.F.L. Learners Dictionary Reference Skills and Reading Comprehension.* In.Gregory James (ed.) (1989) *Lexicographers and Their Works*. (Exeter Linguistic Studies Vol.14, Ed. Gregory James), pp. 192-200.