AN ELECTRONIC CORPUS OF WORD DEFINITIONS IN GREEK BY MONOLINGUAL AND BILINGUAL SPEAKERS

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ABSTRACT

This paper focuses on the construction of an electronic corpus of word definitions. It is an open electronic database, which includes more than 7000 word definitions produced in Greek, orally, by monolingual (L1 Greek) and bilingual speakers (L1 Turkish, L2 Greek). More specifically, it points out explicitly the main characteristics of this electronic corpus and, also, presents the sample that provided the word definitions. Furthermore, are analyzed the basic methodological principles and approaches that were applied, the planning of user interfaces is described as well as the users' access way since the ultimate goal is the creation of a complete electronic environment of searching and retrieving definitions by a database. Finally, this paper describes the usefulness of the electronic corpus of word definitions for each researcher while it also mentions how this electronic corpus of word definitions (henceforth eCoDe) will evolve in the future.

Keywords: Electronic corpus, definitions, monolingual, bilingual.

INTRODUCTION

Electronic corpora provided much in each area of Linguistics, using systems that allow the management, storage and search of a large number of language data. The word corpus (in plural, corpora) comes from the Latin word corpus which means "body" in which can be electronically stored and processed a large set of texts. These texts can be in written or spoken or in a combined form of the two available on computers as software or via internet (Cook 2003:73). According to Sinclair's (1996:4) corpus is "a collection of pieces of language that are selected and ordered according to explicit linguistic criteria in order to be used as a [representative] sample of the language". A corpus can be synchronic (closed), presenting a snapshot of the language of a particular period, or it can be a monitor corpus, where new material is added on a continual basis.

Word definitions give a linguistic corpus for researchers who want to investigate different aspects of cognitive, linguistic and metalinguistic development. According to previous research, there are many factors that influence the production of definitions, such as grammatical categories (Markowitz & Franz 1988, McGhee-Bidlack 1991, Nippold et al. 1999, Johnson & Anglin 1995, Gavriilidou 2015, Colombo et al. 2016, Dourou 2019b), word structure (Dourou 2018, 2019b), semantic characteristics (Reynolds & Paivio 1968, McGhee-Bidlack 1991, Johnson & Anglin 1995, Sadoski et al. 1997, Nippold et al. 1999, Gavriilidou 2015, Dourou 2019b), age (Benelli et al. 1988, Snow 1990, McGhee-Bidlack 1991, Johnson & Anglin 1995, Kurland & Snow 1997, Nippold et al 1999, Marinellie & Johnson 2003, Benelli et al 2006, Caramelli, Borghi & Setti 2006, Gavriilidou 2015) gender (Gavriilidou 2015, Dourou 2019b) education level (Walker 2001, Benelli et al. 2005, Benelli, Belacchi, Gini &

Lucangeli 2006, Dourou 2020), career orientation (Dourou 2019b). Even if definitions of words are represent seemingly simple statements in their surface structure, incorporate abstract relationships between concepts and can be studied both in content and form. This article is an attempt to show the benefits of an electronic corpus, consisted of verbal productions of word definitions, in the field of language development.

THE ELECTRONIC CORPUS OF WORD DEFINITIONS (eCoDe)

The eCoDe is an open electronic database and includes more than 7000 word definitions produced orally, in Greek, by monolingual (C1 Greek) and bilingual speakers (C1 Turkish, C2 Greek), who reside in region of Thrace (Greece). The material was collected with the help of data collection tools presented in the research of Gavriilidou (2011, 2015) and Dourou (2019b). The words, included in the electronic corpus of word definitions and used as the data collection tool, are sixteen, of which eight are nouns, four verbs and four adjectives. Of the sixteen words, ten were identified according to their frequency through the Textbooks of the Modern Greek Language of Elementary School, Junior and Senior High School and the remaining were included from Gavriilidou's (2011, 2015) research. In order to check words' frequency, the textbooks were transformed into text files (txt) and they were introduced in the AntConc 3.5.0 programme, in order to create word frequency lists. The sixteen words, that were chosen, are depicted in Table 1.

Table 1. Definitional task grouped per word categories

Words from Textbooks of the Modern Greek Language of Elementary School	*erotisi 'question'*	**Noun**	**Abstract**	**simple**
	taksiði 'journey'	**Noun**	**Abstract**	**derivative**
	iʌovasilema 'sunrise'	**Noun**	**Abstract**	**compound**
	makrozoia 'longevity'	**Noun**	**Abstract**	**compound**
	tiropita 'cheese pie'	**Noun**	**Concrete**	**compound**
	maçeropiruno 'cutlery'	**Noun**	**Concrete**	**compound**
	aspromavros 'black-and-white'	**Adjective**		**compound**
	ɣlikoksinos 'sweet-sour'	**Adjective**		**compound**
	aniɣoklino 'open and close'	**Verb**		**compound**
	siɣotraɣuðo 'hum	**Verb**		**compound**
Words from Gavriilidou's research(2011)	*milo 'apple'*	**noun**	**Concrete**	**simple**
	poðilato 'bicycle'	**noun**	**Concrete**	**derivative**
	eksipnos 'intelligent'	**adjective**		**simple**
	astios 'funny'	**adjective**		**simple**
	diavazo 'read'	**verb**		**simple**
	xorevo 'dance'	**verb**		**simple**

The eCoDe includes definitions of words provided by monolingual speakers and, especially, by (a) preschoolers, (b) lower elementary students, (c) upper elementary students, (d) junior high school students, (e) senior high school students, (f) university students in Humanities, (g) university students in Medicine, (h) high educated adults and (i) low educated adults. More specifically the number of definitions that provided by each group is depicted in Table 2.

Table 2. Total number of definitions by each group of monolingual speakers

Groups of monolingual Speakers	Number of definitions
Preschoolers	528
Lower Elementary	576
Upper Elementary	560
Junior High students	560
Senior High students	800
University students in Humanities	800
University students in Medicine	528
High Educated Adults	400
Low Educated Adults	400
Total	5152

The table below (Table 3) depicts, also, the total number of definitions that provided by bilingual groups of speakers and, especially, (a) by upper elementary students, (b) junior high school students, (c) senior high school students, (d), high educated adults and (e) low educated adults. At this point, it should be again emphasized that this is an open database that is constantly being enriched with new definitions. This also justifies the lack of definitions by some groups.

Table 3. Total number of definitions by each group of bilingual speakers

Groups of bilingual Speakers	Number of definitions
Preschoolers	0
Lower Elementary	0
Upper Elementary	448
Junior High students	320
Senior High students	512
University students in Humanities	0
University students in Medicine	0
High Educated Adults	400
Low Educated Adults	400
Total	2080

METHODOLOGY

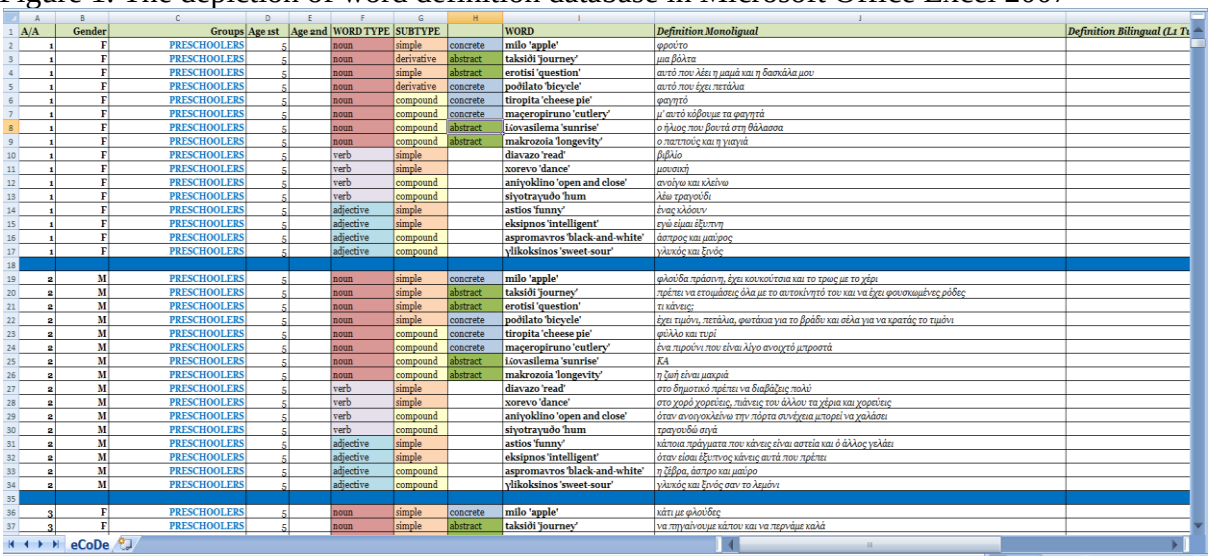
The construction of the open electronic database

For the needs of the interface implementation with the eCoDe, took place the following tasks:

1. The excel file (Figure 1) converted to csv format. The excel file included all document data distributed and stored in columns. In the first column was recorded the gender of the participants (feminine / masculine), in the second column was recorded the educational level of the participants (preschoolers, lower elementary, upper elementary, junior high school, senior high school, university students in Humanities, university students in Medicine, high educated and low educated adults). In the third and fourth column was recorded the age of the participants (separately the age of monolinguals from the age of bilinguals). The fifth column included the grammatical characteristics of words (noun, verb, adjective), the sixth column

included the word structure (simple and compounds), while the seventh column included the semantic characteristics (concrete and abstract nouns). The eighth column included the sixteen words that participants were asked to define (Dourou 2019). Finally, in the last two columns were recorded the definitions provided by monolinguals and bilinguals respectively.

Figure 1. The depiction of word definition database in Microsoft Office Excel 2007



A/A	Gender	Groups	Age ast	Age and	WORD TYPE	SUBTYPE		WORD	Definition Monoligual	Definition Bilingual (L1 Tu
1	F	PRESCHOOLERS	5		noun	simple	concrete	milo 'apple'	φρούτο	
1	F	PRESCHOOLERS	5		noun	derivative	abstract	taksiði 'journey'	μια βόλτα	
1	F	PRESCHOOLERS	5		noun	simple	abstract	erotisi 'question'	αυτό που λέει η μαμά και η δασκάλα μου	
1	F	PRESCHOOLERS	5		noun	derivative	concrete	podilato 'bicycle'	αυτό που έχει πετάλια	
1	F	PRESCHOOLERS	5		noun	compound	concrete	tiropita 'cheese pie'	φαγητό	
1	F	PRESCHOOLERS	5		noun	compound	concrete	maçeropiruno 'cutlery'	μ΄αυτό κόβουμε τα φαγητά	
1	F	PRESCHOOLERS	5		noun	compound	abstract	lióvasilema 'sunrise'	ο ήλιος που βουτά στη θάλασσα	
1	F	PRESCHOOLERS	5		noun	compound	abstract	makrozoia 'longevity'	ο παππούς και η γιαγιά	
1	F	PRESCHOOLERS	5		verb	simple		diavazo 'read'	βιβλίο	
1	F	PRESCHOOLERS	5		verb	simple		xorevo 'dance'	μουσική	
1	F	PRESCHOOLERS	5		verb	compound		aniyoklino 'open and close'	ανοίγω και κλείνω	
1	F	PRESCHOOLERS	5		verb	compound		siyotrayudo 'hum	λέω τραγουδι	
1	F	PRESCHOOLERS	5		adjective	simple		astios 'funny'	ένας κλόουν	
1	F	PRESCHOOLERS	5		adjective	simple		eksipnos 'intelligent'	εγώ είμαι έξυπνη	
1	F	PRESCHOOLERS	5		adjective	compound		aspromavros 'black-and-white'	άσπρος και μαύρος	
1	F	PRESCHOOLERS	5		adjective	compound		ylikoksinos 'sweet-sour'	γλυκός και ξυνός	
2	M	PRESCHOOLERS	5		noun	simple	concrete	milo 'apple'	φλούδα πράσινη, έχει κουκούτσια και το τρως με το χέρι	
2	M	PRESCHOOLERS	5		noun	simple	abstract	taksiði 'journey'	πρέπει να ετοιμάσεις όλα με το αυτοκίνητό του και να έχει φουσκωμένες ρόδες	
2	M	PRESCHOOLERS	5		noun	simple	abstract	erotisi 'question'	τι κάνεις;	
2	M	PRESCHOOLERS	5		noun	simple	concrete	podilato 'bicycle'	έχει τιμόνι, πετάλια, φωτάκια για το βράδυ και σέλα για να κρατάς το τιμόνι	
2	M	PRESCHOOLERS	5		noun	compound	concrete	tiropita 'cheese pie'	φύλλο και τυρί	
2	M	PRESCHOOLERS	5		noun	compound	concrete	maçeropiruno 'cutlery'	ένα πιρούνι που είναι λίγο ανοιχτό μπροστά	
2	M	PRESCHOOLERS	5		noun	compound	abstract	lióvasilema 'sunrise'	ΚΑ	
2	M	PRESCHOOLERS	5		noun	compound	abstract	makrozoia 'longevity'	η ζωή είναι μακριά	
2	M	PRESCHOOLERS	5		verb	simple		diavazo 'read'	στο δημοτικό πρέπει να διαβάζεις πολύ	
2	M	PRESCHOOLERS	5		verb	simple		xorevo 'dance'	στο χορό χορεύεις, πιάνεις του άλλου τα χέρια και χορεύεις	
2	M	PRESCHOOLERS	5		verb	compound		aniyoklino 'open and close'	όταν ανοιγοκλείνω την πόρτα συνέχεια μπορεί να χαλάσει	
2	M	PRESCHOOLERS	5		verb	compound		siyotrayudo 'hum	τραγουδώ αγιά	
2	M	PRESCHOOLERS	5		adjective	simple		astios 'funny'	κάποια πράγματα που κάνεις είναι αστεία και ο άλλος γελάει	
2	M	PRESCHOOLERS	5		adjective	simple		eksipnos 'intelligent'	όταν είσαι έξυπνος κάνεις αυτά που πρέπει	
2	M	PRESCHOOLERS	5		adjective	compound		aspromavros 'black-and-white'	η ζέβρα, άσπρο και μαύρο	
2	M	PRESCHOOLERS	5		adjective	compound		ylikoksinos 'sweet-sour'	γλυκός και ξυνός σαν το λεμόνι	
3	F	PRESCHOOLERS	5		noun	simple	concrete	milo 'apple'	κάτι με φλούδες	
3	F	PRESCHOOLERS	5		noun	simple	abstract	taksiði 'journey'	να πηγαίνουμε κάπου και να περνάμε καλά	

2. The MySQL database set up on server synmorphose.gr and saved the csv file data to a new database table. This was followed by a definition of the characteristics of each column (Primary keys, data type, size, null allowance, auto increment identifiers).
3. A separate table created for user accounts that will be allowed to upload files to the database.
4. Finally, all the following files (Table 4) created in html/php/css related to the operation of the database:

Table 4. Files of eCoDe database, function and user visibility

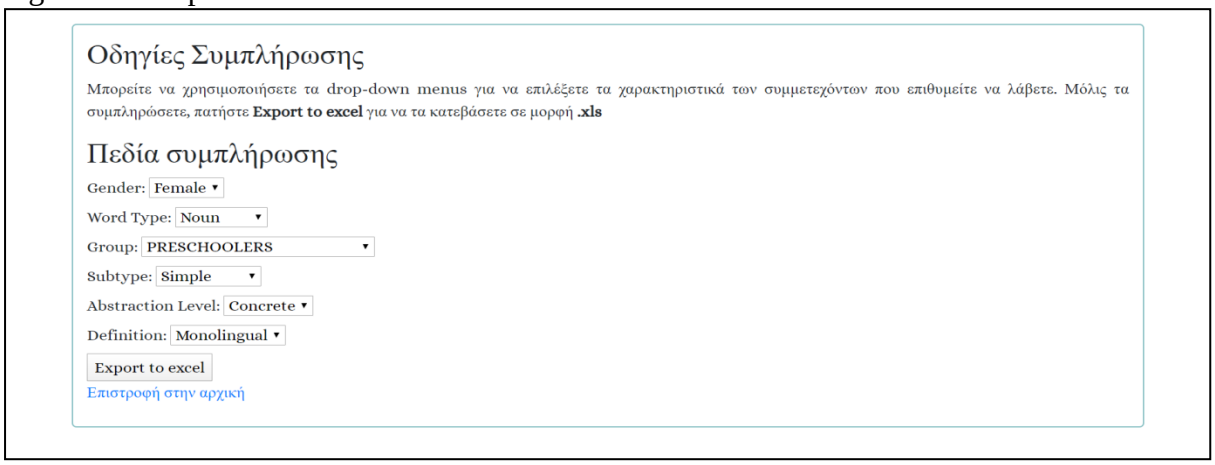
File	Function	User visibility
index. php	Introductory information	Yes
home.html	Completion form with the registration features desired by the user	Yes
login.php	Existing user login page	Yes
profile.php	Connected user upload page	Yes
signup.php	New user sign up	Yes
export_data.php	Search in database, using the home.html form, and return the final file	No
db.php	File that connects to the database	No
constants.php	Save credentials of the database	No
authController.php	All functions related to the sign up and confirmation of new users	No
style_intro.css	Format home.html and index.php pages	No
style.css	Format signup.php and login.php pages	No

It is, also, used the programming language CSS, HTML, PHP 7.3 and MySQL database. The connection and installation of the system on the server was done through the C-Panel. It should be, also, noticed that the scripting language PHP is one of the most common language for creating such programs. It is specialized for use in web applications, providing extensive support for connecting to databases and communicating with webservers and browsers. In a web-accesible database, PHP scripts interpret and carry out user actions, including requests to view data, to log on or off the system and to insert or update data in the database. The necessary data is fetched from the database and formatted into html pages. The web server then sends the generated pages to the user's browser for display.

5. Every user can visit the website http://synmorphose.gr/index.php/el/ [in Greek] in order to proceed to the research tab where they will find the electronic corpus of word definition. Afterwards, they can go to database, where the completion form is. Through this form (Figure 2), the users with the drop-down menus can select the features of the participants that wish to receive. Once they have completed them, could click *Export to excel* to download them in .xls format. The typical features of the interface of eCoDe include:

- definitions based on the native language from the two groups of speakers (monolingual / bilingual)
- definitions based on the educational level of speakers
- definitions based on the gender of speakers
- definitions based on the educational level of speakers
- definitions based on the career orientation of speakers
- definitions based on the grammatical categories of the words (nouns, adjectives, verbs)
- definitions based on the word structure (simple, derivative, compound)
- definitions based on the semantic characteristics of the words (abstract and concrete nouns)

Figure 2. Completion Form of the Interface Window



DISCUSSION

The usefulness of eCoDe

Definitions can be studied from different angles. The eCoDe opens up possibilities for the study of language development since the user can enter the database, can upload word definitions provided by different age groups and compare them with each other. Definitions, though a rather specialized speech genre, are of both theoretical and practical interest to students of language development (Snow et al. 1991).

There are many developmental changes during the school years. These changes are, also, reflected on the way that students define words. Many studies examined the ability to define words as well as the types of definitions provided by preschoolers (Feifel & Lorge 1950, Al-Issa 1969, Wolman & Barker 1969, Anglin 1977, Litowitz 1977, Nelson 1978, Wehren, De Lisi, & Arnold 1981, Benelli et al 1988, Nippold 1995, Nippold et al 1999, Benelli et al 2006, Gavriilidou 2011, 2015) and found that students in early childhood prefer functional and descriptive definitions or produce error definitions (Dourou 2019b) because they have not retrieved the relevant vocabulary, they have not constructed a suitable framework for the transmission of information and they have not yet developed the ability to classify into categories. During elementary school, children develop many skills that help them in the ability to define words. According to research (Wolman & Barker 1965, Al-Issa 1969, Swartz & Hall 1972, Wilson 1975, Litowitz 1977, Nelson 1978) younger children tend to make definitions based on the most obvious features (functions or appearance) of objects. Only after the age of 7-8 can children provide definitions that include more abstract and formal elements. Caramelli, Borghi & Setti (2006) examined the definition ability of children aged 10-13 years and showed that the complexity of the definitions increases with age and the definitions produced by the older children were characterized by a variety of strategies. As children get older (Junior and Senior High School), superordinate terms begin to appear in their productions and definitions become more elaborated and complete (Dourou 2019b).

Definitional skills develop not only by age but are, also, depended by word characteristics. It is believed that complex interactions exist between age development and grammatical categories, morphological structure and semantic characteristics of words. Through the eCoDe the researcher can examine the effect of grammatical categories on word definitions according to age development. Early studies (Markowitz & Franz 1988, McGhee-Bidlack 1991, Nippold et al. 1999, Johnson & Anglin 1995, Friedmann et al. 2011, Gavriilidou 2011, 2015, Colombo et al. 2016) focused on the definition of various parts of speech and especially of nouns. They asked people of different ages to explain the meaning of some nouns (e.g. what is an *apple*?) and the results showed that from early childhood to adolescence and adulthood the nouns are easier to be defined (both in content and form) than other parts of speech, such as verbs or adjectives. The improvement of definition in relation to age development is also reflected in the types of definition.

The electronic corpus of word definitions gives, also, the chance to researchers to examine the effect of word structure on definitions because there are very few studies that examine the role of simple and compound words in production of definitions (Dourou 2019b, 2020). There are not only the grammatical categories and the word structure that affect the productions of speakers on the way they define concepts. There are many studies that focused on the level of abstraction that may affect the definition ability (Mc Ghee-Bidlack 1991, Johnson & Anglin 1995, Sadoski, Kealy, Goetz & Paivio 1997, Nippold et al. 1999, Gavriilidou 2015). So, a user can examine the concreteness and abstraction of word definitions and how the semantic characteristics of words influence the definitional ability and the types of definitions provided by speakers.

One more variable that can be examined is the role of gender on the definitional ability. On the exception of Gavriilidou (2015) and Dourou (2019b) who studied the effect of gender on the definition of word, no other studies focused on the way that men and women define concepts. Such research may also be engage the attention of sociolinguists on how men and women use language and define words.

In addition, educational level is an important factor in the definitional ability. Several studies (Luria 1976, Benelli et al. 2006, Dourou 2020) have noted a very significant difference between adults with a high educational level and adults with a low educational level. Researchers, using the eCoDe, can investigate if formal education is an important factor affecting to the definitional ability of adults.

Career orientation could have an effect on the definitional performance of adults, since it may reflect different language use motivational goals and different instruction. The user of eCoDe could compare the performance of University students (Humanities or/and Medicine) and, also, their definitional skills. As Dourou (2019) claimed, students in Health Sciences (Medicine) had better performances than students in Humanities because they are exposed to the use of medical terminology from the first year of their studies so they are interested in providing correct definitions to succeed to their exams and also do their jobs well in future (instrumental motivation), while students in other sciences may have mixed (integrative or instrumental) relationship to their production of definitions.

Moreover, the user of the eCoDe can compare definitions between monolingual and bilingual speakers. Considerable evidence suggests that bilingual children have higher levels of metalinguistic skill than monolingual children. Bilingual children have had an opportunity to develop control of processing to a greater extent than monolingual children (Bialystok 1986). Research focused on the ability of bilinguals to define words has found that bilingual children provided better definitions in the language of formal instruction (Snow 1990, Snow, 1991). Knowledge of vocabulary was also an important factor in the definitional ability (Carlisle et al. 1999). Charkova (2005) compared 120 Bulgarian students, 40 monolinguals, 40 bilinguals (L1 Bulgarian, L2 English) and 40 trilingual (L1 Bulgarian, L2 English, L3 Russian) in word definition performance in L1. The study found that bilingual and trilingual children performed better than monolinguals.

The difference between content (meaning) and form (syntactic structure) in definitional paths draws the most interest. The users of the eDoDe could upload definitions in order to study the content of the definitions and the types of content the definitions offer (e.g. synonyms, functional, descriptive, definitions by example, self-reference definitions, formal definitions) but, also, to examine the syntactic structure of definitions through their types (one word, a phrase, transitional form, formal definitions) (Dourou 2019b). It is also possible to focus on the internal grammatical structure of sentences (Tunmer et al. 1984). According to Johnson and Anglin (1995), children are generally more successful at providing precise word meaning (content) than in providing conventional syntactic form. This means that comprehensive knowledge or skill for formation of syntactic structure may occur later in development.

Development of definition is a gradual process that starts from early childhood and follows an upward trend as the student attends school (Dourou 2019b). Then affect a number of other factors (career orientation, educational level) in their ability to define words. So, through the electronic corpus of word definitions, each researcher can study all these factors and the way they affect not only on the definitional ability but also on the types of definitions.

CONCLUSIONS-LIMITATIONS-FUTURE INVESTIGATION

The electronic corpus of word definitions is available on the website http://synmorphose.gr/index.php/el/ . It is constantly updated with new word definitions that

are either related to existing groups or others that are added according to the needs of the research. To date, it is the first electronic corpus that includes oral word definitions in Greek. Through this electronic corpus of word definition (eCoDe), the user can compare (a) the ability to define monolingual and bilingual populations and (b) the definitions between two or more languages, because the future aim is to be enriched with other definitions and to be evolved in a multilingual electronic corpus of word definitions. Its evolution into a multilingual electronic corpus of definitions aims to help researchers in studying the typology of the native language of bilinguals (Turkish or other languages) and its influences on the way they define words.

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