

An Experiment on Plato's Gorgias as an Introduction to Textometry

Bénédicte Pincemin, Stéphane Marchand

► To cite this version:

Bénédicte Pincemin, Stéphane Marchand. An Experiment on Plato's Gorgias as an Introduction to Textometry. Classics@, 2022, Digital Text Analysis of Greek and Latin sources, 20. halshs-01730373

HAL Id: halshs-01730373 https://shs.hal.science/halshs-01730373

Submitted on 26 Aug2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers. L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

An Experiment on Plato's *Gorgias* as an Introduction to Textometry

Bénédicte Pincemin, Stéphane Marchand

1. Background: What is Textometry? How could it concern Classical Studies?

Current implementations of Digital Humanities for classical studies are often either rich digital editions, with much effort devoted to display a pleasant layout and to offer efficient navigation paths; or indexed corpora or databases with querying facilities, for which the focus is on searching functionalities and not on primary text visualization and reading. However, through the example of the textometric approach (presented in section 1.1) that is implemented in TXM open-source software (1.2), we would like to show that complex textual representation and computational analysis can be both taken into consideration into a unique digital framework (1.3). In order to show that such a method can offer great possibilities for researchers in the Classics field, we will give a more complete presentation of the methodology applied to Plato's *Gorgias* (section 2 and 3).

1.1 What is textometry?

Textometry is a computer-assisted textual analysis method that is based on word counts (or on any linguistic feature counts) and that links statistical processing to data referencing and contextual comparison. Main textometric functions are specificities (a keyword computation), correspondence analysis (a geometrical view of the corpus content), cooccurrences (lexical collocations), and KWIC (Keyword in context) concordances (for a technical presentation of these functions, see appendix, section 5).

The textometric methodology was founded in the 70s in France (Léon and Loiseau 2016). Benzécri and his students launched the *analyse des données* field and created new exploratory multivariate statistical methods, mainly correspondence analysis and its combination with clustering (Benzécri 1973, 1981). Then, the Saint-Cloud Laboratory coined the word "lexicometry" (which would evolve later to "textometry" and "logometry", but the core procedures remain the same) and added new methods especially dedicated to quantitative lexical analysis: specificities (*spécificités*), collocations (*cooccurrences*) (Lafon 1984), phrase detection with repeated segments (*segments répétés*) (Salem 1987). At Nice University, Brunet was also a pioneer in developing and applying these new methods to French literature (Brunet 2011). An overview of the methods is gathered in Lebart, Salem, and Berry 1998. Moreover, since 1992, the JADT Conference (International conference on statistical analysis of textual data), which is led by the textometric scientific community, has been held every two years; its proceedings have been published online since 1998 on the Lexicometrica website.¹

Compared to other text analysis methods, textometry is a balanced combination of quantitative and statistic methods on the one hand, and qualitative methods on the other hand. It occupies an intermediate position between text mining (which replaces the textual data by quantitative summaries, extractions, and visualizations) and annotation software (which enrich and investigate a detailed view of the text); in other words it achieves both a close reading and a distant reading.

Several textometric applications are currently available for research, like DtmVic, Hyperbase, Lexico, IRaMuTeQ, Trameur, TXM.² In this paper our example will be run with TXM.

1.2 What is TXM?

TXM is an open-source textometric software that was initiated in 2009 within the frame of the Textométrie project (2007–2010, founded by the ANR French agency), gathering four research laboratories, from Lyon, Paris, Nice, and Besançon. Its development is coordinated by Serge Heiden (Lyon, IHRIM laboratory), and the two main developers are Matthieu Decorde (Lyon, IHRIM Laboratory) and Sébastien Jacquot (Besançon, ELLIAD Laboratory) (Heiden 2010).³

¹ JADT conference archives: http://lexicometrica.univ-paris3.fr/jadt/index.htm

² Here are the websites for these applications: DtmVic: http://www.dtmvic.com ; Hyperbase: http://ancilla.unice.fr/hyperbase ; Hyperbase Web Edition: http://hyperbase.unice.fr ; IRaMuTeQ: http://www.iramuteq.org ; Lexico 5: http://www.lexi-co.com ; Trameur: http://www.tal.univ-paris3.fr/trameur ; TXM: see next footnote.

³ Textometry project and TXM software website: http://textometrie.org

The aim of the Textometry project was for the new software to be able to fully manage and analyze state-of-art corpora, that is, structured and annotated corpora, like TEI corpora. Another aim was to launch an open-source development the partners could share.

TXM implements the textometric approach, so that it includes specificities, correspondence analysis, cooccurrences, and back-to-text facilities implemented as an advanced concordance view linked to a text view. This paper will show some other available functions too: progression in section 3.2, and index (word frequency lists) mainly in 3.4. Indexing and searching are operated by the CQP⁴ component (Christ 1994; Evert and Hardie 2011), and statistical computing relies on R⁵ components; processing can be extended or personalized with scripts. One of TXM main features is its ability to input many kinds of digital texts, from plain text to generic XML and XML-TEI. On the basis of these features, TXM is a fifth generation concordancer according to McEnerey and Hardie typology (McEnery and Hardie 2012).

TXM runs on Windows, Linux, MacOS, and can also be set as a web portal version, for collaborative work or on-line corpus publication.⁶

1.3 Three (Functions) in One (Digital Edition): Reading, Searching, Analyzing

As textometry pays attention both to complex queries and statistics, and to fine text reading, it can be a new unified framework for digital editions in a classical studies context. With a TXM solution, for example, humanists are not compelled to choose between either a digital edition, or a database, or a search engine, to study and publish their text corpora.

Actually, TXM is a *search engine*. Complex queries can be processed about words, phrases, morphosyntactic patterns (or patterns based on any other information that has been added to the corpus through tagging), also allowing for search patterns that include gaps (like, for instance, in ancient Greek $\mu \grave{\epsilon} v \dots \delta \grave{\epsilon}$). Queries can cross information from every level, from lexical tags to text structures, which can be internal structures (inside texts, like chapters) or overall structures about groups of texts (like author or text genre).

⁴ CQP stands for Corpus Query Processor, which is the name of the search engine component included in the IMS Open Corpus Workbench (CWB) (see http://cwb.sourceforge.net) initially developed at the University of Stuttgart (http://www.ims.uni-stuttgart.de/forschung/projekte/CorpusWorkbench).

⁵ R is a freely available language and environment for statistical computing and graphics. CRAN (The Comprehensive R Archive Network, http://cran.r-project.org) is currently one of the main providers for open-source and up-to-date statistical packages.

⁶ The developer environment and some of user documentation (user manual [Heiden, Decorde, and Jacquot 2018], user interface, mailing list) are available in English.

At the same time TXM is a *database* that manages text documents. Numerous metadata can be associated to each document (such as author, date of composition, text type, etc.), and selection of documents can be built based on the metadata's values. This can be illustrated by the text selection function in the Base de français médiéval instance of TXM web portal version (Figure 1),⁷ which shows very detailed selection panels that are used like database query forms. Furthermore, any textual unit, from words or text chunks to text groups, can be described with metadata information, and then be used to target a selection in combination with any information on any text level. For instance, one may focus on sentences which include some linguistic pattern and which were written within a given time span.

e txm.bfm	-corpus.org - Mozilla Firefox											
Contraction of the second	.org											_
C D K txm.bf	m-corpus.org			C	Q base de francais	médiév 🕈 🖶 🎁	া যে ≣			*	ZUT	=
👫 ВЕМ2016 🏫 🕻	💭 🕕 😜 🔲 III AZ 🗛 III 📰 🤧	1				Bénédicte Pin	cemin Mon p	rofil Se	déconnecter	Aide	Contact	fr 🗸
Corpus	Accueil 🏠 BFM2016 🕺 🙀 Selection de	BFM20	016 ×									
Corpus ^	Stats										Valider	r
C BERINUS	▲ id bfm (0/153)		notice	T auteur	titre	date compo libre	ms date li	forme	domaine		A M	Inte
C BFM2013	▲ auteur (0/50)	0	(81)	130 anonyme	Serments de Strasbourg	842	ca 1000	Drose	iuridique	C	en :	013
F C BEM2014	(0100)	8	123	130 anonyme	Serments de Suasbourg	042	ca. 1000	prose	Junaique		Те	extes
BEM2016	× thre (0/131)			211 anonyme	Sequence de sainte Eulaile	peu apres 601	ca. 900	vers	reigieux		🔨 idbfm	
E PENNES	A siècle (1/6)	U		905 anonyme	Sermon sur Jonas	prob. entre 938 et 952	2e q. 10e s.	prose	religieux		▲ auteur	
	✓ date œuvre	0		3419 anonyme	Passion de Jesus-Christ ou Passion de Clermont	ca. 1000	ca. 1000	vers	religieux		🔨 titre	
C BL2FRO	De: 1134 🗸 à: 1249 🗸	Ο		1677 anonyme	Vie de saint Léger	ca. 1000	ca. 1000	vers	religieux		∧ siecle	
C BL2LAT	ОК	ñ		35304 anonyme	Chanson de Roland	ca. 1100	2e g.12e s.	vers	littéraire		 text bfmdate 	
C BL2PAR		õ		16710 Philippe de Thaon	Comput	1113 ou 1119	3e g 12e s	vers	didactique		text_onnotic	1-1-
C BL2PAR		0		Philippe de Thaon	Compar	1110 00 1110	00 q. 100 0.	Verb	underidee		 text_bimmsd 	Jale
CORPTEF		O		10705 (probable)	Lapidaire alphabétique	1e tiers 12e s.	ca. 1200	vers	didactique		 forme 	
C GRAAL		0		50616 anonyme	Psautier d'Oxford	1e m. 12e s.	mil. 12e s.	prose	religieux		 domaine 	
E C PALAFR	▲ date ms	×	a1)	15882 Philippe de Thaon	Bestiaire	entre 1121 et 1135	3e q. 12e s.	vers	didactique		🗸 genre (33)	
C PALAFR	✓ forme (1/3)	h.	true	nonyme	Gormont et Isembart	ca. 1130	1e g. 13e s.	vers	littéraire		roman	_
C PSARUND	valeur 🔷 n N t T 🔺		all	4885 anonyme	Liver del iuïse	2eg 12es	déh 13e s	Vers	religieux		hagiographie	e
C SANTE	mixte 0 8 0 112148	ň	(21)	1500 anonyme	Description d'Engleterre	peu après 1139	déb 13e c	vere	historique		épique	
	prose 0 74 0 3005136	0		1303 anonyme	Description d'Engleterre	ca 1140 (version éditée	ueb. 10e 5.	VCIS	historique		chronique	
	Vers 27 71 750 1564096	×		31936 anonyme	Chanson de Guillaume	: 1er t. 13e s.)	mil. 13e s.	vers	littéraire		récit bref	_
		0		5515 anonyme	Lapidaire en prose	mil. 12e s.	déb. 13e s.	prose	didactique		bestiaire	_
		Ō		807 anonyme	Psautier de l'Orne	12e s.	12e s.	prose	religieux		sermon	=
	✓ domaine (3/7)	~		42569 anonyme	Roman de Thèbes	ca. 1150 (version éditée : 2e t. 13e s.)	2e t. 13e s	vers	littéraire		✓ dialecte (20)	
	✓ littéraire 22 52 608 137	1		30260 anonyme	Roman de Thèbes	ca. 1150 (version éditée : 2e t. 13e s.)	2e t. 13e s.	vers	littéraire		anglo-norman	nd
	politique 0 1 0 1818	1		26963 Guillaume de Saint Pair	Chronique rimée du Mont Saint Michel	3e q. 12e s., plutôt vers 1155	2e m. 13e s.	vers	littéraire		normand	wonal
	✓ religieux 4 36 125 940 ▼	0		18037 Wace	Brut	achevé en 1155	déb. 13e s.	vers	historique		portevin	
		1		40546 anonyme	Eneas	ca. 1155	ca. 1200	vers	littéraire		Ouest	
	▲ genre (0/33)	1		29000 anonyme	Eneas	ca 1155	ca 1200	vers	littéraire		Nord-Ouest	t.
	▲ dialecte (0/20)			22200 anonyme	Eleire et Planehofler		1200 p et	Here	littéraire		franco-picard	d
	 relation (0/5) 	~		23236 anonyme	Pione et Blanchettor	ca. 1150-1160	1289 N.St.	vers	interaire		liegeois	
	norphosynt (0/2)	U	E	5247 anonyme	Psautier de Cambridge	entre 1155 et 1160	av. 1160	prose	religieux		relation	
	▲ restrictions (0/2)	0	81	55899 anonyme	Commentaire en prose sur	prob. 1163-1164	ca. 1200	prose	religieux		 morphosynt 	
											 restrictions 	

Figure 1. Text selection in the Base de Français Médiéval TXM web portal.

Then, TXM provides a wide range of corpus linguistic functions to process these lexical and textual selections (word frequency lists, KWIC concordance, collocations, keyword analysis, distributions, multidimensional analysis, etc.; see section 1.2). These analytic features can be coupled with a fine text encoding (like XML-TEI), making it possible to record precise philologic

⁷ Base de français médiéval: http://bfm.ens-lyon.fr

information⁸ and to build fine-tuned HTML *editions* to visualize the text (Figure 2). One important feature of the process is the possibility to manage and distinguish information used as text content (words to be searched and counted), and information useful to follow the history of the text, assess its structure, and assist text reading and interpretation (critical apparatus, editorial text divisions, speech turn labels, etc.). If available, facsimiles of source documents can be displayed so that the researcher still has a view on the primary document. Thus one keeps access to information that might have been lost because of necessary digital encoding choices.



Figure 2. Synoptic views of the *Queste del Saint Graal* in a TXM web portal edition (Marchello-Nizia and Lavrentiev 2013): here two kinds of transcriptions and the manuscript image are aligned.

Thus with this example we see that it is possible to give the same text a unified digital edition that offers all together searching facilities, database querying, and an elaborated and precise layout. The aim of the two following sections is to present in concrete terms what kind of investigations may be done within such a framework, in the context of ancient Greek studies and current digital resources.

⁸ For instance, the TEI provides means to encode gaps, additions, deletions, notes, emphasis, etc.

2. Corpus Example: Plato's Work, from Perseus to TXM⁹

2.1 Choice of the texts

As a first experiment of TXM on ancient Greek literature, we have chosen to study a corpus of Plato's texts, because one of us has a good knowledge of these texts, especially of *Gorgias* (Marchand and Ponchon 2016). Actually, the textometric approach presupposes some acquaintance with the corpus to be investigated, because this approach does not compute an analysis on behalf of the researcher: one cannot give the corpus as input, run a (black box) program, and get what would be the complete textometric analysis for the corpus. On the contrary, it is the responsibility of the researcher to lead the investigation and to raise relevant questions so that the produced results can really be meaningful and fruitful. Since *Gorgias* is a rather small, well studied text, we already have some concrete ideas about its features before starting the textometric analysis, so we can check the results of our textometric analysis against our prior knowledge. Furthermore, the software allows one to perform queries that are impossible for a human reader, or at least that would consume a large amount of time. At any rate, we could take this software as an empirical tool that allows us to test some hypotheses, or to give us some clues to continue investigating such an intriguing dialogue as *Gorgias*, and Plato's work more widely.

We downloaded the XML-TEI edition of the Burnet edition of Plato's texts, published by the Perseus Digital Library¹⁰ and provided under a Creative Commons Share Alike 3.0 license. For this experiment, among the 36 available texts, we excluded the works that are generally considered as *spuria* or *dubia* and, for stylistic reason, the letters.¹¹ Hence the corpus is composed of 29 texts: *Euthyphro*, *Apology*, *Crito*, *Phaedo*, *Cratylus*, *Theaetetus*, *Sophist*, *Statesman*, *Parmenides*, *Philebus*, *Symposium*, *Phaedrus*, *Alcibiades* 1, *Alcibiades* 2, *Charmides*, *Laches*, *Lysis*, *Euthydemus*, *Protagoras*, *Gorgias*, *Meno*, *Hippias Major*, *Hippias Minor*, *Ion*, *Menexenus*, *Republic*, *Timaeus*, *Critias*, and *Laws*.

⁹ The import process followed here and the resources associated with it are available on txm-users wiki: https://groupes.renater.fr/wiki/txm-users/public/perseus. The page which is dedicated to this article (https://groupes.renater.fr/wiki/txm- users/public/perseus_201707_plato) provides also the binary (.txm) version of Plato's corpus, which can be directly loaded into TXM: this binary version allows one to skip the technical stages of the import process.

¹⁰ Perseus Home: http://www.perseus.tufts.edu/hopper; Text repository: https://github.com/PerseusDL/canonical-greekLit.

¹¹ Most of the *Letters* are considered as spurious. Moreover the *Letters* belong to a different text type and would disturb contrastive analysis within the corpus (we could study them separately, in another corpus).

2.2 From Perseus TEI encoding to TXM

When we prepared this corpus in June and July 2017, TEI encoding of Plato's texts in Perseus was heterogeneous. We had to deal with texts in several states: last updates made in 2017, 2015, 2014, and 1992. 2017 texts were clearly a new encoding generation. Two texts (*Ion* and *Republic*) used a particular encoding scheme, for instance regarding the use of the <div> element and the marking of the sections' beginning. We decided not to modify sources (which are continuously evolving and improving thanks to the Perseus community), but to make automatized and limited changes during the import process so as to get a usable corpus, even if the TXM user had to contend with some inherited heterogeneity (this is especially the case for speaker information). These automatic changes were processed with XSL and CSS stylesheets,¹² used as parameters in the XML-XTZ¹³ import.

The main stylesheet, applied in the second stage of the import process, manages some XML-TEI features of Perseus texts (about nested <div> or <text>) in order to make them compliant with TXM processing (especially for the CQP search engine component embedded in TXM). It automatically gets information from <teiHeader> and associates it with each text instance in TXM: <title>, <author>, and <editor> from <titleStmt> (first mention for each element), and also the content of @when attribute for first (or most recent) <change> element in <revisionDesc>.¹⁴

Another XSL stylesheet builds the default references provided for word matches in KWIC concordance view: we chose to show the usual name for the text followed by the Estienne page number (Figure 3). Additionally, we ensured that CTS-URN information, providing unique and standard identifiers to cite digital textual data, is also available at the word level, and can alternatively be chosen for references if needed (Figure 4). The main stylesheet was also used to add page break <pb> elements (with the page number) so as to have the same pages in TXM as in the Perseus edition.

¹² We are very grateful to Alexei Lavrentiev (CNRS, IHRIM, Lyon), who helped us to adapt the stylesheets to our corpus and needs.

¹³ XTZ stands for XML-TEI Zero, that is, this import is intended to process XML-TEI files, taking into account the semantics of some common elements (<text>, , <ab>, <lg>, <head>, <lb>, <pb>, <w>, <graphic>, <ref>, <note>, <hi>, <emph>, <list>, <item>, , <row>, <cell>) if they occur (no mandatory element except <text>). By default, other elements are kept for the analysis and have no rendering in corpus edition view, but this can be fine-tuned by means of XSL and CSS parameter stylesheets. More information is available online in TXM documentation: developer specifications (https://groupes.renater.fr/wiki/txm-info/public/import_xtz), user manual (https://txm.gitpages.huma-num.fr/txm-manual/importer-un-corpus-dans-txm.html#module-xml-tei-zerocsv-dit-aussi-xtzcsv-ou-xtz-import-de-xml-tei-generique-.xml).

¹⁴ A normalized form for short title (title1) and date (update10) is also provided by a metadata.csv parameter file.

👌 🐸 🗛 🛛 Quick Ac	cess 🖻 🖻			
PLATO170720C:"έμπ	ειρι.*"%d 🛛			- 8
Query: 🎤 📕 έμπειρι.	*"%d		Keyword: word Edit	Search
ort keys: #1 None	*) #2 None *) #3 None *) #4 None	\$ Sort		
<u>×</u> 🖉	< < 1 ·	36/36 >	Hi	de setting
ref	Left context	36 / 36 > Keyword	> Hi Right context	de setting
ref Parmenides, s. 0137a	ι< < 1 - Left context πρεσβυτέρω, ὑφ΄ ἄρματι μέλλοντι ἀγωνιεῖσθαι καὶ δι΄	36/36 > Keyword έμπειρίαν	 Hi Right context τρέμοντι τὸ μέλλον, ἐαυτὸν ἀπεικάζων ἄκων ἔφη καὶ αὐτὸς οὕτω ηρ 	de setting εσβύτης
ref Parmenides, s. 0137a Philebus, s. 0055e	Left context μεσβυτέρω, ὑφ΄ ἄρματι μέλλοντι ἀγωνιεῖσθαι καὶ δι΄ ταῦτ΄ εἰκάζειν λείποιτ' ἀν καὶ τὰς αἰσθήσεις καταμελετῶν	36 / 36 > Keyword έμπειρίαν έμπειρία	Η Right context Τρέμοντι τὸ μέλλον, ἑαυτὸν ἀπεικάζων ἅκων ἔφη καὶ αὐτὸς οὕτω πρ καί τινι τριβῆ, ταῖς τῆς στοχαστικῆς προσχρωμένους δυνάμεσιν ἂς π	de setting εσβύτης ιολλοὶ τέχ
ref Parmenides, s. 0137a Philebus, s. 0055e Phaedrus, s. 0270b	Left context Πρεσβυτέρω, ὑφ΄ ἄρματι μέλλοντι ἀγωνιεῖσθαι καὶ δι΄ ταῦτ΄ εἰκάζειν λείποιτ' ἂν καὶ τὰς αἰσθήσεις καταμελετἂν , εἰ μέλλεις, μὴ τριβῆ μόνον καὶ	36 / 36 > Keyword έμπειρίαν έμπειρία έμπειρία	Η Right context τρέμοντι τὸ μέλλον, ἑαυτὸν ἀπεικάζων ἅκων ἔφη καὶ αὐτὸς οῦτω πρ καί τινι τριβῆ, ταῖς τῆς στοχαστικῆς προσχρωμένους δυνάμεσιν ἂς π ἀλλὰ τέχνῃ, τῷ μὲν φάρμακα καὶ τροφὴν προσφέρων ὐγίειαν καὶ ῥώ	de setting εσβύτης ιολλοὶ τέx ομην
ref Parmenides, s. 0137a Philebus, s. 0055e Phaedrus, s. 0270b Gorgias, s. 0448c	Left context Πρεσβυτέρω, ὑφ΄ ἄρματι μέλλοντι ἀγωνιεῖσθαι καὶ δι΄ ταῦτ΄ εἰκάζειν λείποιτ' ἂν καὶ τὰς αἰσθήσεις καταμελετᾶν , εἰ μέλλεις, μὴ τριβῆ μόνον καὶ , πολλαὶ τέχναι ἐν ἀνθρώποις εἰσιν ἐκ τῶν	36/36 > Keyword έμπειρίαν έμπειρία έμπειρία έμπειριῶν	Η Right context τρέμοντι τὸ μέλλον, ἑαυτὸν ἀπεικάζων ἅκων ἕφη καὶ ἀὐτὸς οῦτω πρ καί τινι τριβῆ, ταῖς τῆς στοχαστικῆς προσχρωμένους δυνάμεσιν ἀς π ἀλλὰ τέχνῃ, τῷ μὲν φάρμακα καὶ τροφὴν προσφέρων ὑγίειαν καὶ ῥώ ἑμπείρως ηὐρημέναι · ἑμπειρία μὲν γὰρ ποιεῖ τὸν αίῶνα ἡμῶν πορεύε	de setting εσβύτης ιολλοὶ τέχ ομην εσθαι κατ
ref Parmenides, s. 0137a Philebus, s. 0055e Phaedrus, s. 0270b Gorgias, s. 0448c Gorgias, s. 0448c	Left context πρεσβυτέρω, ὑφ΄ ἄρματι μέλλοντι ἀγωνιεῖσθαι καὶ δι΄ ταῦτ΄ εἰκάζειν λείποιτ' ἂν καὶ τὰς αἰσθήσεις καταμελετἂν , εἰ μέλλεις, μὴ τριβῆ μόνον καὶ , πολλαὶ τέχναι ἐν ἀνθρώποις εἰσὶν ἐκ τῶν ἀνθρώποις εἰσὶν ἐκ τῶν ἐμπειριῶν ἐμπείρως ηὐρημέναι	36/36 > Keyword έμπειρίαν έμπειρία έμπειρία έμπειριῶν έμπειρία	Hi Right context τρέμοντι τὸ μέλλον, ἐαυτὸν ἀπεικάζων ἅκων ἔφη καὶ ἀὐτὸς οῦτω πρ καὶ τινι τριβϳη, ταῖς τῆς στοχαστικῆς προσχρωμένους ὅυνάμεσιν ἀς π ἀλλὰ τέχνῃ, τῷ μἐν φάρμακα καὶ τροφἡν προσφέρων ὑγίειαν καὶ ῥώ ἑμπείρως ηὑρημέναι · ἑμπειρία μὲν γὰρ ποιεῖ τὸν αίῶνα ἡμῶν πορεύε μὲν γὰρ ποιεῖ τὸν αίῶνα ἡμῶν πορεύεσθαι κατὰ τέχνην, ἀπειρία δὲ	de setting εσβύτης ιολλοὶ τέχ ομην εσθαι κατ

Figure 3. Concordance view with default references in the first column (short title

followed by Estienne page number).¹⁵

Guick Access	3		
III PLATO170720C:"ἐμπειρι.*"%d 🛛			8
Query: 🇪 "έμπειρι.*"%d			▼ Keyword: word Edit Sea
sort keys: #1 None ‡ #2 No	ne 🗘 #3 None 🗘 #4 None 🗘 Sort		
× 🖉	<pre> < < 1 -36/36 > > </pre>		Hide setti
ctsurn	Left context	eyword Rig	ght context
tlg0059_tlg009_perseus-grc2:137a	πρεσβυτέρω, ὑφ΄ ἄρματι μέλλοντι ἀγωνιεῖσθαι καὶ δι΄ έμ	ιπειρίαν τρέ	έμοντι τὸ μέλλον, ἑαυτὸν ἀπεικάζων ἄκων ἔφη καὶ αὐτὸς οὕτι
-	τοῦτ' εἰκάζειν λείποιτ' ἂν καὶ τὰς αἰσθόσεις καταμελετῶν έι	πειοία καί	ί τινι τριβή, ταῖς τῆς στοχαστικῆς προσχρωμένους δυνάμεσιν
tlg0059_tlg010_perseus-grc2:55e	and and a service of a service a ser		
tlg0059_tlg010_perseus-grc2:55e tlg0059_tlg012_perseus-grc2:270b	, εί μέλλεις, μη τριβή μόνον και έμ	υπειρία άλλ	λὰ τέχνῃ, τῷ μὲν φάρμακα καὶ τροφὴν προσφέρων ὑγίειαν κα
tlg0059_tlg010_perseus-grc2:55e tlg0059_tlg012_perseus-grc2:270b tlg0059_tlg023_perseus-grc2:448c	είου εικαζειν πειποτε αν και τας αισοπρείς καταμεπεταν εί , εί μέλλεις, μή τριβή μόνον και έι , πολλαὶ τέχναι έν ἀνθρώποις είσὶν ἐκ τῶν ἑμ	μπειρία άλλ ιπειριῶν έμι	λὰ τέχνη, τῷ μὲν φάρμακα καὶ τροφὴν προσφέρων ὑγίειαν κα πείρως ηὑρημέναι · ἑμπειρία μὲν γὰρ ποιεῖ τὸν αίῶνα ἡμῶν πο
tlg0059_tlg010_perseus-grc2:55e tlg0059_tlg012_perseus-grc2:270b tlg0059_tlg023_perseus-grc2:448c tlg0059_tlg023_perseus-grc2:448c	, εί μέλλεις, μη τριβή μόνον καὶ έ , και μέλλεις, μη τριβή μόνον καὶ έ , πολλαὶ τέχναι ἐν ἀνθρώποις είσιν ἐκ τῶν ἐμ ἀνθρώποις είσιν ἐκ τῶν ἐμπειριῶν ἐμπείρως ηὐρημέναι - ἰ ἐ	μπειρία άλλ ιπειριῶν έμι μπειρία μέν	λὰ τέχνῃ, τῷ μἐν φάρμακα καὶ τροφὴν προσφέρων ὐγίειαν κα πείρως ηὐρημέναι - ἐμπειρία μὲν γὰρ ποιεῖ τὸν αίῶνα ἡμῶν πο ν γὰρ ποιεῖ τὸν αίῶνα ἡμῶν πορεύεσθαι κατὰ τέχνην, ἀπειρία

Figure 4. Concordance view with references set to CTS-URN (first column).

We wanted to keep and show clearly speech turn information and speaker information, without indexing the protagonist's name as a word to be counted and searched as such. To this aim we declared <speaker> and <label> elements as "Out-of-text-to-edit" element in import parameters. As text encoding in Perseus was heterogeneous, speaker information is also heterogeneous in TXM. Speech turns are defined by either <sp> or <said> element (depending on the text), and speaker is indicated with @who attribute only in <said> elements (but not all of them) for analysis purposes, and is displayed using <label> or <speaker> element content when available (Figure 5).

¹⁵ The query is: "ἐμπειρι.*"%d. It matches any word beginning with ἐμπειρι, and the %d operator allows diacritic variations, so that this query matches ἐμπειριῶν but also ἐμπειρία with an accent on the last ι.

23	23
	23

	<237>	Â
Θεαίτητε χαλεπόν		a.
ΘΕΑΙ τί δό		
ΞΕ. τετόλμηκεν ὁ λόγος οὐτο ἡμῖν οὖσιν ἀρχόμενός τε καὶ δ οὐ γὰρ μήποτε τοῦτο δαμῆ, φ ἀλλὰ σὺ τῆσδ' ὡφ' ὀδοῦ διζŕ (Parmenides Fr. 7.1) παρ' ἐκ τοῦτο οὖν αὐτὸ πρῶτον θεασι	ς ὑποθέσθαι τὸ μὴ ὃν εἶναι -ψεῦδος γὰρ ούκ ἂν ἄλλως ἐγίγνετο ὄν. Παρμει διὰ τέλους τοῦτο ἀπεμαρτύρατο, πεζῇ τε ὦδε ἐκάστοτε λέγων καὶ μετὰ μέτρ ρησίν, εἶναι μὴ ἐόντα · ἡμενος εἶργε νόημα. είνου τε οὖν μαρτυρεῖται, καὶ μάλιστά γε δὴ πάντων ὁ λόγος αὐτὸς ἂν δ ώμεθα, εἱ μή τί σοι διαφέρει.	νίδης δὲ ὁ μέγας, ὠ παῖ, παισὶν ων — δηλώσειε μέτρια βασανισθείς.
ΘΕΑΙ. τὸ μὲν ἐμὸν ὅπῃ βούλε	ει τίθεσο, τὸν δὲ λόγον ἡ βέλτιστα διέξεισι σκοπῶν αὐτός τε ἴθι κἀμὲ κατὰ τ	αύτην τὴν ὀδὸν ἅγε.
ΞΕ. άλλὰ χρὴ δρâν ταῦτα. καί	μοι λέγε · τὸ μηδαμῶς ὄν τολμῶμέν που φθέγγεσθαι ;	
ΘΕΑΙ. πῶς γὰρ οὕ ;		
ΞΕ. μὴ τοίνυν ἕριδος ἕνεκα	μηδὲ παιδιάς, ἀλλ' εἰ σπουδῆ δέοι συννοήσαντά τινα ἀποκρίνασθαι τώ	υν άκροατῶν ποῖ χρὴ τοὕνομ' 💡
default	8 3 23 / 54 9 9	

Figure 5. TXM edition view of Sophist, Estienne page 237a-e.

We should just stop a minute on that: it means that with this edition of Perseus corpus in TXM, one can search the word $\Gamma op\gamma (\alpha \varsigma \text{ and differentiate between the instances of this word in the title (obviously one instance), in speaker names (97 instances in 1 dialogue),¹⁶ and in the speech of any protagonist (85 instances in 7 dialogues);¹⁷ one could also study which words are typical of Socrates' or Gorgias' speech. This functionality opens up a lot of possibilities, namely, to study the particular style of each protagonist of the platonic dialogue.$

Bibliographic references encoded with <bibl> element in Perseus texts are declared and processed as a kind of note element for TXM XML-XTZ import: as such, they get a relevant display (see Figure 5) and are not mixed with the Greek content.

Every annotation made in Perseus texts, for instance, named entities (<name>, <persName>, <placeName>) or quotation tags (<q>, <quote>), are automatically available in TXM for search and analysis. An associated rendering could be added through the CSS stylesheet parameter if desired.

In addition, in order to test new possibilities offered by morphosyntactically tagged texts, we prepared a second corpus using the unique text of Plato available in Perseus TreeBank AGDT2:¹⁸

 $^{^{\}rm 16}$ Example of query to find every beginning of Gorgias' speech turns:

<said>[_.said_who="#Γοργίας" & _.said_rend!="merge"]

¹⁷ Example of query to find mentions of Gorgias' name in the text: "Γοργί.*". The 7 dialogues with "Gorgias" occurrences are *Apology, Gorgias, Hippias Major, Meno, Phaedrus, Philebus,* and *Symposium*. Since we had no morphosyntactically tagged version of our texts, we use wild-cards to get a rough lemmatization. This query matches Γοργία, Γοργίας, Γοργίαν, Γοργία.

¹⁸ Ancient Greek Dependency Treebank AGDT2: https://perseusdl.github.io/treebank_data.

Euthyphro. We imported this text in TXM via the XML/w loader with the Perseus TreeBank stylesheet¹⁹ as parameter. This corpus will be used here for one example in section 3.4.

3. A Typology of Textometric Analyses

For our example, we focus on the text of *Gorgias*, in comparison with Plato's other dialogues. So we define two structures inside the corpus: first, a *sub-corpus* containing only the *Gorgias* text, so that any textometric analysis (i.e. a KWIC concordance, a frequency list, etc.) can be processed on this text only. The second structure that we define is a *partition* of the corpus into texts, that is, we divide the corpus into parts (texts) so that we can compute contrastive analyses in order to compare texts to one another.

We have chosen to organize the typology according to the user's needs, that is, which kind of queries one would like to ask the corpus. These query types don't exactly match textometric functions, since one computation may be of use in several ways, and one type of query may get an answer through the complementary results of several functions.

3.1 Checking for occurrences and evaluating frequencies

To look at word frequencies in *Gorgias*, we can either compute raw frequencies, or compare the *Gorgias* subcorpus to the whole corpus of Plato using a statistic test, computing the specificities' score of each word (more precisely, each form of the word, since our corpus is not lemmatized) (see technical appendix 5.1).

Thus, for *Gorgias*' vocabulary, we can sort the results either by absolute frequency, or by specificities' score. In Figure 6, the left panel shows the most frequent words used in *Gorgias*, which here is useless since the most frequent words of *Gorgias* are the most frequent words in the corpus of Greek literature: they are "stop-words" like $\kappa \alpha i$, $\delta \epsilon$, and so on…²⁰ If we apply a stop-word filter,²¹ we get the most frequent content words of the text, giving account for the main vocabulary used in *Gorgias* (see middle panel).

¹⁹ txm-filter-perseustreebank-xmlw.xsl, available in TXM repository:

https://sourceforge.net/projects/txm/files/library/xsl/.

²⁰ To see a list of the ancient Greek stop-words, cf.

 $https://wiki.digital classicist.org/Stopwords_for_Greek_and_Latin.$

²¹ There is no direct command in TXM to do this. If the corpus is tagged with part-of-speech, then this information makes it easy to select and filter out grammatical words (see example in Figure 18). Here, we downloaded Berra's stop-word list (https://github.com/aurelberra/stopwords); we used the CreateCQPList TXM macro (https://groupes.renater.fr/wiki/txm-users/public/macros) to read the stop-word file and build a variable containing all the stop-words (about 6,000 items); then we called this variable ("grc_stopwords") in the query to

Image: Image		MZ Gorgias: [w	ord!=\$grc_stopwords 🛛	ויין Gorgias: word 🖾						
			5	Units	Frequency T 613406	Gorgias t=30870	≜ score			
Query:	[word!="\p{P}+ '"]	Query:	[word:=\$grc_scopwords & '	Καλλίκλεις	62	62	80.5			
		Thresholds: F	min: 1 * Emay: 0000000	Πώλε	39	39	50.6			
Thresholds	: Fmin: 1 📮 Fmax: [Thresholds. T	nin. 1 + 1 nidx. (333333).	Γοργία	32	32	41.5			
			<	άδικεῖσθαι	46	34	33.8			
		1		άδικεῖν	116	48	30.8			
	Þ	(4())		σù	797	124	27.8			
word	Frequency	word	Frequency	ρητορική	24	20	22.0			
καί	1473	Σωκρατες	104	Γοργίας	28	21	21.3			
τÒ	368	OOKEL	92	έγὼ	944	124	21.2			
δὲ	354	Καλλίκλεις	62	ρητορικής	23	19	20.8			
η̈́	350	δεί	50	αἴσχιον	24	18	18.4			
ŵ	281	άδικεῖν	48	έστιν	976	120	18.2			
τῶν	256	οίμαι	47	σοι	953	116	17.3			
άν	244	άγαθὸν	42	ŵ	3262	281	17.2			
VE	241	Πῶλε	39	;	9340	656	16.6			
μέν	236	άνάγκη	38	πῶλος	12	12	15.6			
ะโงตเ	226	δίκην	36	κάκιον	23	16	15.5			
Ŏτι	214	άδικεῖσθαι	34	ρητορικήν	25	16	14.7			
νάο	209	λόγον	33	φημί	43	20	14.5			
inc	190	Γοργία	32	ρητορικήν	11	11	14.3			
	103	ἀληθῆ	31	δίκην	169	36	12.7			
ti įv	104	άνθρώπων	31	έστιν	413	60	12.6			
-2	103	όρθῶς	31	λέγω	458	64	12.6			
ια	181	δίκαιον	30	ρητορική	13	11	12.4			
00	180	πόλει	28	άδίκως	49	19	12.0			
3T	178	νυνδή	26	ρητορική	11	10	12.0			
TOU	1/8	λόγος	25	έγωγε	462	63	11.9			
0	176	οίει	25	φημι	56	20	11.8			
μη	173	φαίνεται	25	ρήτωρ	18	12	11.4			
τÒν	169	λόγους	24	ή	4776	350	11.4			
ούκ	168	μέγα	24	διδόναι	64	20	10.6			
ούν	168	βούλει	23	Χαιρεφῶν	13	10	10.6			
εl	167	δηλον	23	έλεγον	142	29	10.0			
περὶ	157	σώμα	23	βελτίους	71	20	9.7			
άλλ'	146	δικαίως	22	άγαθὸν	279	42	9.5			
ή	141	Γοργίας	21	πιθανώτερο	ς 7	7	9.1			
τοὺς	137	καλῶς	21	πειθούς	22	11	87			

Figure 6. For *Gorgias*, the list of most frequent word forms²² (left panel), the same list without stop-words (middle panel), and the statistically most specific word forms (right panel).

The right panel may be more interesting, as it shows the words statistically over-used in *Gorgias* by comparison with the 28 other texts from Plato. The fact that the first three specific forms are Kallikikeig, $\Pi \tilde{\omega} \lambda \epsilon$, and $\Gamma o p \gamma i \alpha$, that is, names of the protagonists, was expected, since those three protagonists do not appear elsewhere in Plato's work, and then are naturally specific to Plato's *Gorgias*.

exclude words matching any item of the stop- list. As TXM default tokenization preserves elided word forms (like $\dot{\alpha}\lambda\lambda'$, δ' , etc.), for this experiment we just added to Berra's list the elided stop-words we found among the high-frequency words of our corpus. (We might also have changed the tokenization rules.)

²² TXM indexes punctuations too, so here the query filters punctuation signs out.

More significant is the fact that they are vocative forms, which are highly frequent in the dialog form: Gorgias is a dialog that is a real exchange (like Laches, Euthydemus, Euthyphro, *Hippias Major*, for instance), and not the very particular form of platonic dialog where the protagonists do not really interact intensively with each other, which are closer to a series of monologues (like the Laws, the Parmenides, Republic, and the Timaeus). This "dialogic" aspect of Gorgias became evident at the first sight of the specificities of the dialog: not only the overuse of vocative Σώκρατες, but also such dialog markers as σύ, ἐγώ, ὦ... Those first results show by linguistic means the refutative nature of the Gorgias, which is an attempt to refute sophistic positions and to expose the immoral implications in the hedonist position defended by Callicles. For Socrates, this requires repeatedly questioning the interlocutor (using the vocative), summarizing his argument (by using σv + verbs of saying $\phi \eta \varsigma$, $\delta \mu o \lambda \delta \gamma \epsilon \iota \varsigma$, $\delta \lambda \epsilon \gamma \epsilon \varsigma$, $\lambda \epsilon \gamma \epsilon \iota \varsigma$...: "you says, you agree, you said..."), and opposing it with his own position (ἐγὼ λέγω, ἔλεγον...) (see also Figure 16 in section 3.4). Admittedly, *Gorgias* is not the only dialog where we can find those markers; they are common to what the scholarship calls the "Socratic dialogs," which entails an ἔλεγχος, a refutation. But regarding those features, the textometric approach shows that Gorgias is representative, if not the dialog par excellence (Figure 7). It reveals that this dialog is paradigmatic, even something of an achievement of this method, since the dialog suddenly ends with a monolog and the acknowledgment that it is impossible to refute those who do not agree with the basic requirements of a rational discussion; that is why it ends with a myth. This analysis confirms the hypothesis that Gorgias is a transitional dialog, where Plato shows the limits of the Socratic method and the necessity to endorse another philosophical method.²³

²³ On this hypothesis, see (Marchand and Ponchon 2016:17–18).



Figure 7. Specificities of $\dot{\epsilon}\gamma\dot{\omega}$ and $\sigma\dot{\upsilon}$ in the texts of the Plato corpus.

3.2 Visualizing the evolution of words or linguistic features

The TXM progression functionality is another way to analyze word distribution when data can be considered as a continuous evolution: this can be the case for a corpus when its texts are ordered according to time, or when focusing on one text, considering how it is organized from beginning to end. This second case can be applied to the *Gorgias*.

After the dialogic markers, the list of the specificities above shows also what are roughly the main themes of the dialog. The subtitle (which is probably not from the hand of Plato) of *Gorgias* is "on the rhetoric" ($\pi\epsilon\rho$ ì ἡ τ ορικῆς), and it is well known that the main topic is a critique of the practices of the ἡ η τορες, the men who deliver rhetorical speeches and teach rhetoric. Despite this very fact, the word ἡ η τορική (more precisely, all the forms of the adjective ἡ η τορικός)²⁴ appear mostly in the first quarter of the dialog (there are 107 instances in *Gorgias*, and 85 appear from 448d to 466a, that is, in the discussion with Gorgias himself) (Figure 8).

²⁴ Since the corpus is not lemmatized, we submitted the query "ῥητορικ.*" (Figures 8 to 12 have been computed with this query).



Figure 8. Cumulative evolution graph for ῥητορική in *Gorgias*²⁵ (upper frame), and hyperlinked concordance and text view on a selected occurrence (lower frames).

This is due to the fact that the Socratic criticism of rhetoric is a moral criticism of the way of life involved in the practice of the rhetoric. Socrates shows that the practice of rhetoric, as the faculty to persuade a crowd in order to take power, involves an immoral principle, namely, that it is better to do wrong than to suffer it. On the contrary, the philosophy of Socrates lies in the belief that it is better to suffer wrong than to do it (see *Gorgias* 469c, the question from Polos: εἰ δ' ἀναγκαῖον εἴη ἀδικεῖν ἢ ἀδικεῖσθαι, ἑλοίμην ἀν μᾶλλον ἀδικεῖσθαι ἢ ἀδικεῖν; "if it were necessary either to do wrong or to suffer it, I should choose to suffer rather than do it," translation Lamb from Perseus). For that reason, the forms ἀδικεῖσθαι and ἀδικεῖν are among the most specific forms of the *Gorgias* (they appear just after the three vocatives already

²⁵ X-axis represents the *Gorgias* text from its first word to its last word; Y-axis represents the number of occurrences of words beginning by ῥητορικ- since the beginning of the text. Thus, the more the curve rises, the more occurrences there are in the current passage. A flat curve means no occurrences of the word in the passage.

mentioned Καλλίκλεις, Πῶλε, and Γοργία), although they are in general quite common in Plato's work.²⁶

A glance at the table of frequencies and graph of specificities of the adjective $\dot{p}\eta\tau\sigma\rho\iota\kappa\dot{o}\varsigma$ (all its cognates) in every text of our corpus (Figure 9) shows, however, that $\dot{p}\eta\tau\sigma\rho\iota\kappa\dot{o}\varsigma$ is typical of the *Gorgias*, for the very reason that it is not very common in Plato's work: hence, even if Plato does not continually use the word in the dialog, it is nonetheless characteristic of the *Gorgias* (107 instances, specificity of +108), and to a lesser extent the *Phaedrus* (21 instances, specificity of +8) (these texts are the only two where the specificity score is greater than +3).²⁷



Figure 9. Specificities of ῥητορική in the texts of the Plato corpus.

E. Schiappa has polemically stated that it could be possible that Plato coined the word ἡητορική.²⁸ This is not the place to take a position on the external evidence discussed by Schiappa, who claims that all the texts that employ the word ῥητορική in the fourth century can be considered contemporary or later than Plato.²⁹ But the tool here allows us to confirm the fact that in Plato "the various forms of ῥητορική are curiously distributed." (Schiappa 1990:463) and

²⁶ 46 instances in Plato of ἀδικεῖσθαι (34 in Gorgias); 116 instances of ἀδικεῖν (48 in Gorgias). The query "ἀδικ.*" on whole of Plato's work shows, with no surprise, a massive presence in *Republic* (164 instances), *Gorgias* (163 instances), and *Laws* (103 instances); the presence in *Republic* and *Laws* has to be relativized by the size of the dialogs (respectively 104,572 and 116,925 words, whereas for *Gorgias* there are 30,870 words).

²⁷ See the other instances, *Statesman* 304e, 304d; *Republic* 548e; *Menexenus* 235e, 236a (bis), *Euthydemus* 307a, *Cratylus* 425a, *Alcibiades* 2 145e, *Thaetetus* 177b.

²⁸ Schiappa 1990. See also the criticisms of O'Sullivan 1993 and the revised Schiappa 1999.

²⁹ By the facts, the dates of those texts are difficult to determine, as is the case for Alcidamas or the *Rhetoric to Alexander*.

the graph shows that this curious distribution relies on the specificity of *Gorgias*' vocabulary (Figure 9).³⁰

3.3 Refining a word's meaning with systematic contextual use

The KWIC concordance view is a core functionality in the textometric approach, as it shows very precisely and efficiently how a word is used in the text. The context size can be adjusted if needed, but for a view of a larger selection of text, a double-click on a concordance line opens a hypertext link to the corresponding text page with the search word highlighted. The two views are dynamically aligned: selecting a line in the concordance shows the corresponding page in the text edition (Figure 10).

III PLATO170720C:"pr	торік.*" 🛙			🛄 tlg0059_tlg023_perseus-grc2 - 5 🖾
Query: 🇪 phopus sort keys: #1 None	* #2 None * #3 None	▼ K ‡ #4 N	teyword: word Edit Search	ΣΩ. πασών δή οίμαι τών τεχνών τών μὲν ἐργασία τὸ πολύ ἐστιν καὶ λόγου βραχέος δέονται, ἔνιαι δὲ οὐδενός ἀλλὰ τὸ τῆς τέχνης περαίνοιτο ἂν καὶ διὰ σιγῆς, οἰον γραφικὴ καὶ ἀνδριαντοποία καὶ ἀλλαι πολλαί. τὰς τοιαύτας μοι δοκείς
* 🥒	< < 1 -100/138 >	>	Hide settings	λέγειν, περὶ ἂς ού φὴς τὴν <mark>ῥητορικὴν</mark> εἶναι · ἡ οῦ ;
ref Phaedrus, s. 0271d Phaedrus, s. 0272d	Left context γχάνει ψυχαγωγία οὖσα, τὸν μέλλοντα ι ὄντων ἢ τροφῆ, τὸν μέλλοντα ἰκονῶς	Keyword ῥητορικὸν	Right context ἕσεσθαι ἀνάγκη εἰδέναι ψυχ ἔσεσθαι τὸ παράπαν νὰρ οι	τομ. πάνυ μὲν οὖν καλῶς ὑπολαμβάνεις, ὠ Σώκρατες. ΣΩ.
Alcibiades 2, s. 0145 Euthydemus, s. 0307 Gorgias, s. 0448d Gorgias, s. 0449a Gorgias, s. 0449c	ο τὸ ἀποκτεινώναι, πρὸς δὲ καὶ ἀνδρῶν a v δοκεί σοι είναι, καὶ χρηματιστικὴ καὶ ς καὶ ἐξ ὡν εἴρηκεν ὅτι τὴν καλουμένην ιαλεῖν ὡς τίνος ἐπιστήμονα τἐχνης. τῆς ; βραχυλογωτέρου ἀκοῦσαι. φέρε δή	ρητορικών ρητορική ρητορική ρητορικής ρητορικής	πολιτικόν φύσημα φυσώντι καὶ στρατηγία ; ἔμοιγε πάντι μάλλον μεμελέτηκεν ἢ διαλέ , ὦ Σώκρατες. ῥήτορα ἄρα : γὰρ φὴς ἐπιστήμων τέχνης ε	ἔτεραι δέ γέ είσι τῶν τεχνῶν αι διὰ λόγου nâν περαίνουσι, καὶ ἕργου ὡς ἕπος εἰπεἰν ἡ οὐδενὸς προσδέονται ἡ βρακέος πάνυ, οἰον ἡ ἀριθμητικὴ καὶ λοι τολιαὶ τέχναι, ὡν ἕνιαι σκεδόν τι ἴσους τοὺς λόγους ἕχουσι ταῖς πράξεσιν, αἰ δὲ πολλαὶ πλείους, καὶ τὸ παράπαν nâσα ἡ πράξις καὶ τὸ κῦρος αὐταῖς διὰ λόγων ἑστίν. τῶν τοιοίτων τινά μοι δοκείς λέγειν τὴν βητορικήν.
Gorgias, s. 0449d Gorgias, s. 0449d Gorgias, s. 0449e Gorgias, s. 0450b	καὶ ποιῆσαι ἂν καὶ ἄλλον ῥήτορα · ἡ Ͽι δή μοι ἀπόκριναι οὕτως καὶ περὶ τῆς οὑκ ἄρα περὶ πάντας γε τοὺς λόγους ἡ τί οὖν δή ποτε τὰς ἄλλας τέχνας οὑ	ρητορική ρητορικής ρητορική οπτορικάς	περὶ τί τῶν ὄντων τυγχάνει ‹ , περὶ τί τῶν ὄντων ἐστὶν ἐπι ἑστιν. ού δῆτα. ἀλλὰ μὴν λέγ καλεῖς. οῦσας περὶ λόγους. ‹	<i>ΓΟΡ.</i> άληθῆ λέ <mark>γεις.</mark> ΣΩ.
Gorgias, s. 0450b Gorgias, s. 0450b Gorgias, s. 0450c Gorgias, s. 0450d	αλεῖς, οῦσας περὶ λόγους, εῖπερ ταὐτην εἰπεῖν nᾶσά ἐστιν ἡ ἐπιστήμη, τῆς δὲ διὰ λόγων ἐστίν. διὰ ταῦτ' ἐγὼ τὴν δοκεῖς λέγειν, περὶ ἂς οὐ φὴς τὴν	ρητορικήν ρητορικής ρητορικήν οπτορικήν	καλεῖς, ἢ ἂν ἡ περὶ λόγους ; ἐ οὐδἐν ἐστιν τοιοῦτον χειροι τέχνην ἀξιῶ είναι περὶ λόγοι είναι - ἢ οῦ : πάνυ μὲν οὖν κα	άλλ' οŬτοι τούτων γε οὐδεμίαν οἶμαί σε βούλεσθαι <mark> ἡητορικήν</mark> καλεῖν, οὐx ὅτι τῷ ῥήματι οὕτως εἶπες, ὅτι ἡ διὰ λόγου τὸ κύρος ἔχουσα <mark>ῥητορική</mark> ἐστιν, καὶ ὑπολάβοι ἄν τις εί βούλοιτο δυσχεραίνειν ἐν τοῖς λόγοις, τὴν ἀριθμητικὴν ἄρα ῥητορικήν, ὡ Γοργία, λέγεις ; ἀλλ' οὐκ όμαί σε οὖτε τὴν
Gorgias, s. 0450e Gorgias, s. 0450e Gorgias, s. 0450e	ών τοιούτων τινά μοι δοκεῖς λέγειν τὴν ρύτων γε οὐδεμίαν οἶμαί σε βούλεσθαι , ὅτι ἡ διὰ λόγου τὸ κῦρος ἕχουσα	ρητορικήν ρητορικήν ρητορική	. ἀληθῆ λέγεις. ἀλλ' οὕτοι το καλεῖν, οὐx ὅτι τῷ ῥήματι οἰ ἐστιν, καὶ ὑπολάβοι ἄν τις, ε	άριθμητικήν οῦτε τὴν γεωμετρίαν <mark>ἀητορικὴν</mark> λέγειν.
Gorgias, s. 0450e	ειν έν τοῖς λόγοις, τὴν ἀριθμητικὴν ἄρα	ρητορικήν	, ὦ Γοργία, λέγεις ; ἀλλ' οὐκ	default (8) (5 / 82 () (8) (8) (9) (9)

Figure 10. Concordance of ῥητορική in the Plato corpus, and the hyperlinked view of the text page corresponding to one selected concordance line.

Furthermore, the table layout of the KWIC view, coupled with the possibility to sort right and left contexts, reveals the lexical patterns involving the searched word. For instance, sorting on the 'right context' of ῥητορική allows one to find the passages where the concept is defined: all the contexts where ῥητορική is followed by the verb εἶμι (to be) or καλέω (to call) (Figure 11).

³⁰ By the way, among the 30 first words with the highest score of specificity in *Gorgias*, there are 6 forms of ή ρητορική.

🏢 PLATO170720C:"ῥητορικ.*" 🛛				iii tlg0059_tlg023_perseus-grc2 - 17 ⊠
Query: 🎤 рпторик.*			Keyword: word Edit Search	ΠΩΛ.
sort keys: #1 Right cont : #2	None : #3 None : #4	None 🗘	Sort Hide settings	άλλὰ τί σοι δοκεῖ ἡ <mark>ῥητορική</mark> είναι ; ΣΩ. πράγμα ὃ φϳὴς σὐ ποιῆσαι τέχνην ἐν τῷ
ref, said_who	Left context	Keyword	Right context	συγγραμματι ο εγω εναγχος ανεγνων.
Gorgias, s. 0460a, #Σωκράτης	ς. ὥσπερ ἄρτι είπες. ἀποκαλύψας τῆς	ρυτοδικύς	είπε τίς ποθ' ἡ δύναμίς έστιν, ἀλλ'	11127).
Gorgias, s. 0462c, #Πώλος	περγασίας, ούκοῦν καλόν σοι δοκεῖ ἡ	ρυτορικύ	είναι, χαρίζεσθαι οἰόν τε είναι ἀνί	τί τοῦτο λέγεις;
Gorgias, s. 0465d, #Σωκράτης	όψοποιικών. ὃ μὲν οὖν ἐγώ φημι τὴν	ρητορικήν	είναι, άκήκοας · άντίστροφον όψ	ΣΩ.
Phaedrus, s. 0269d, #Σωκράτης	σπερ τάλλα · εί μέν σοι ὑπάρχει φύσει	ρητορικώ	είναι, ἕσῃ ῥήτωρ ἐλλόγιμος, προσ	έμπειρίαν ἕνωνέ τινα.
Gorgias, s. 0462b, #Πῶλος	τάληθή είρήσθαι. άλλὰ τί σοι δοκεί ή	ρητορική	είναι ; πράγμα ὃ φῆς σὺ ποιήσαι τ	apropriate a fast for the second s
Gorgias, s. 0462c, #Πῶλος	έγωγέ τινα. έμπειρία άρα σοι δοκεί ἡ	ρητορική	είναι ; ἕμοιγε, εί μή τι σὺ ἄλλο λέγε	11020.
Gorgias, s. 0450d, #Σωκράτης	δοκεῖς λέγειν, περὶ 뿹ς οὐ φῃς τὴν	ρητορικήν	είναι - ἣ οῦ ; πάνυ μὲν οὖν καλῶς ἀ	έμπειρία ἄρα σοι δοκεῖ ἡ ῥητορικὴ εἶναι ;
Gorgias, s. 0450e, #Σωκράτης	πων γε ούδεμίαν οἶμαί σε βούλεσθαι	ρητορικήν	καλεῖν, οὑχ ὄτι τῷ ῥήματι οὕτως ι	ΣΩ.
Gorgias, s. 0450b, #Σωκράτης	τί οὖν δή ποτε τὰς ἄλλας τέχνας οὐ	ρητορικάς	καλεῖς, οὕσας περὶ λόγους, εἴπερ	ຂຶ້ນອາຫຼຸດ ເຊິ່ມທີ່ 71 ຕູນີ້ ຄື້ມີໄດ ໄດ້ຫຼາຍ
Gorgias, s. 0450b, #Σωκράτης	ιεῖς, οὕσας περὶ λόγους, εἴπερ ταύτην	ρητορικήν	καλεῖς, ἢ ἂν ἦ περὶ λόγους ; ὅτι, ὦ	באסוקיב, בו און נו טט שאוט אבקיבוק.
Phaedrus, s. 0260c, #Σωκράτης	ποῖόν τιν' ἂ ν οἴει μετὰ ταῦτα τὴν	ρητορικήν	καρπὸν ὧν ἕσπειρε θερίζειν ; ού r	ΠΩΛ.
Gorgias, s. 0463d, #Σωκράτης	/μάθοις άποκριναμένου; ἕστιν γὰρ ἡ	ρητορική	κατὰ τὸν ἑμὸν λόγον πολιτικῆς μο	τίνος έμπειρία ;
Gorgias, s. 0453c, #Σωκράτης	ίνα ποτὲ λέγεις τὴν πειθὼ τὴν ἀπὸ τῆς	ρητορικής	καὶ περὶ τίνων αὐτὴν εἶναι. τοῦ ἕνι	50
Euthydemus, s. 0307a, #Σωκράτη	ς δοκεί σοι είναι, καὶ χρηματιστικὴ καὶ	ρητορική	καὶ στρατηγία ; ἕμοιγε πάντως δή	
Gorgias, s. 0502d, #Σωκράτης	 τί δὲ ἡ πρὸς τὸν Ἀθηναίων δῆμον 	ρητορική	καὶ τοὺς ἄλλους τοὺς ἐν ταῖς πόλε	χάριτός τινος και ήδονής άπεργασίας.
Gorgias, s. 0461a, #Σωκράτης	ν άδύνατον είναι άδίκως χρήσθαι τῃ	ρητορική	καὶ ἑθέλειν ἀδικεῖν. ταῦτα οὖν ὅπι	ΠΩΛ.
Gorgias, s. 0461a, #Σωκράτης	λίγον ὕστερον ἕλεγες ὅτι ὁ ῥήτωρ τῇ	ϸητορική	κἃν ἁδίκως χρῷτο, οὕτω θαυμάς	ούκοῦν καλόν σοι δοκεῖ ἡ ἀπτορικὴ εἶναι
Gorgias, s. 0450e, #Σωκράτης	ὴν ἀριθμητικὴν οὕτε τὴν γεωμετρίαν	ρητορικήν	λέγειν. όρθώς γὰρ οἴει, ὦ Σώκρατ	χαρίζεσθαι οἰόν τε είναι ἀνθρώποις;
Phaedrus, s. 0263b, #Σωκράτης	ώμεθα. ούκοῦν τὸν μέλλοντα τέχνην	ρητορικήν	μετιέναι πρώτον μὲν δεῖ ταῦτα ὀδ 🛫	
(4()	1.6	default 🕚 17 / 82 🕑 🐵 🐵 🛞

Figure 11. Concordance of ῥητορική in the Plato corpus, sorted on 'right context'.

Lastly, to have an overview of the platonic approach of the word ὑητορική, one can have a look at its cooccurrents³¹ in the *Gorgias*: this query shows the words especially used by Plato in proximity with ὑητορική and its cognates (Figure 12). The cooccurrence association score is computed with the same statistic measure as the specificity explained above (the cooccurrence score is precisely the specificity of the cooccurrent word in the part formed by the whole set of contexts of ὑητορική in comparison with its global frequency in the corpus). The common feature of the platonic definition of rhetoric appears within a range from -10 to +10 words:³² rhetoric is the name of the competence of the ῥήτωρ; Socrates defines it as "producer of persuasion" (e.g. 453a: πειθοῦς δημιουργός, 453d: πειθὼ ποιεῖν); its definition is given through an analogy as part (μόριον) of the art of flattery (κολακεία; e.g. 463b); it is used in the context of the court (δικαστηρίοις)... It is worth noting that those cooccurrents are also the main cooccurents of the word ῥητορική in all Plato's works.

³¹ What is called "cooccurrence" in textometry is often called "collocation" in corpus linguistics.

³² This context size is a common choice, but the software allows for the exploration of different settings parameters if needed.

μυτρις ρ΄ητορικ.* cooccurrents properties: word Edit Thresholds: Fmin 2 2 Cr Cooccurrents properties: word Edit Thresholds: Fmin 2 2 Cr context: word structure add : Guery: anter the structure add : Guery: cooccurrents properties: word Edit Thresholds: Fmin 2 2 Cr Cooccurrents properties: word Edit Thresholds: Fmin 2 2 Cr context: word structure add : Guery: anter the structure add : Guery: cooccurrent Frequency Cofrequency + Score Mean distance f f 141 35 10 2.6 f 141 35 10 2.6 f 141 35 10 2.6 f 1861 40 14 2.4 púpov 7 7 8 5.0 rih 118 23 5 2.1 dohan 4 4.2.6 12 4 6 2.5 rih 90 18 4 2.6 3.5 5.6 kohaxeiac 3 3 2.3 5.5 5.6 rinibio 3 3	🖡 Gorgias: "ῥητορικ.*" (10, 10) 🛛						PLATO170720C: "ῥητορικ.*" (10, 10)						
Cooccurrents properties: word Edit Thresholds: Fmin 2 2 Crconcurrents properties: word Concurrents properties: word Edit Thresholds: Fmin 2 2 Crcontext: • word o structure add concurrents frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm to 10 \pm 0$ cooccurrent Frequency Cofrequency + Score Mean distance $n + 10 \pm to - 0 \pm and from 0 \pm 0$ $n + 10 \pm to - 0 \pm and from 0 \pm 0$ $n + 10 \pm 0 \pm 0 \pm 0$ $n + 10 \pm 0 \pm 0 \pm 0$ $n + 10 \pm 0 \pm 0 \pm 0$ $n + 10 \pm 0 \pm 0 \pm 0$ $n + 10 \pm 0 \pm$	Query: 🌾	όητορικ.*					Query: 🇪 þ	ητορικ.*					
Cooccurrent Frequency Cofrequency Score Mean distance n 141 35 10 2.6 ncpì 157 33 8 4.7 μόριον 7 7 8 5.0 η/γ 184 33 6 1.44 η/γ 184 33 6 1.44 η/γ 184 23 5 2.1 αλλη 4 4 6.2 160ο/ς 22 6 8 5.5 αλλη 4 4 6.2 160ο/ς 22 6 8 5.5 πειθω 6 4 3 2.5 11 5 3 3.2 16 16 4.7 10 9 6 2.4 ρήτωρ 11 5 3 3.2 16 16 17 16 16 17 10 16 16 16 16 17 16 17 16 17 16	Cooccurrents context: • w rom - 10 ‡	properties: vord () stru to - 0 📜 a	word Edit	Threshold	ds: Fmin ≥ 2 ‡	Crr do	Cooccurrents p Context: • we from - 10 = t	oroperties: v ord () stru	word Edit T cture add	hresholds	: Fmin ≥ 2 ‡ C ダ use left Wind		
Cooccurrent Frequency Cofrequency Score Mean distance n 141 35 10 2.6 nrepù 157 33 8 4.7 µópiov 7 7 8 5.0 rìy 184 33 6 1.4 ŋř 90 18 4 6.2 rň 90 18 4 2.5 riñ 90 18 4 2.5 riñ 90 18 4 2.5 riñ 90 18 4 2.6 neiθôů 12 4 6 2.5 riñ 90 18 4 2.6 neiθôů 11 5 3 3.2 phropů 12 5 3 3.2 phropů 3 2 5.0 reiθôů 3 2 5.0 roňňram 3 2 7.0						_							
ή 141 35 10 2.6 περλ 157 33 8 4.7 μόριον 7 7 8 5.0 τήν 184 33 6 1.4 τής 118 23 5 2.1 άλλη 4 4 6.2 τή 90 18 4 2.6 πειθώ 6 4 3 2.5 κολακείας 3 3 2.5 κολακείας 3 3 3.23 ρήτωρ 11 5 3 3.23 ή 13 8 3.4.4 δίκαστηρίος 4 3 2 5.0 παίθος 3 2 5.0 5 1.0 καστηρίος 4 3 2 5.0 5 1.0 δρίφως 31 8 3 4.4 5 5 5 1.0 καστηρίος 4 3 2 5.0 5 1.0 5 5 5	Cooccurrent	Frequency	Cofrequency	▲ Score	Mean distance	é	Cooccurrent	Frequency	Cofrequency	≜ Score	Mean distance		
περὶ 157 33 8 4.7 μόριον 7 7 8 5.0 rằy 18 4.33 6 1.4 rằy 18 23 5 2.1 άλλη 4 4 6.2 6 9 3.2 rằ< 3 6 1.4 18 6 9 3.5 thý 18 23 5 2.1 18 18 17 7 7 5 5 5 5 17 5 5 5 17 5 5 5 5 17 5 5 5 5 6 2.3 5 6 2.3 5 6 5 <td>ń</td> <td>141</td> <td>35</td> <td>10</td> <td>2.6</td> <td></td> <td>ò</td> <td>1861</td> <td>40</td> <td>14</td> <td>2.4</td>	ń	141	35	10	2.6		ò	1861	40	14	2.4		
μόριου7785.0τὴν1843361.4τῆς1182352.1τῆς1182352.1μόριου8077 $ζη_{1}$ 901842.6τῆ901842.6τειθώ6432.5τειθώ6432.5τειθώ6432.5τειθώ6432.5τειθώ11533.2όήτωρ12533.2όήτωρ12533.2όήτωρ12533.2τώπσση533.2τωπόση533.2όήτωρ12533.2τη1375205τη137520τη133ψανονάs and 44 cooccurrents7πρuting the cooccurrents of <"ἡητορικ.*"> in the Gorginputing the cooccurrents of <"ὑητορικ.*"> in the PLATOφὴς14364δημιουργός1434δημιουργός14364	περί	157	33	8	4.7		ρήτωρ	18	6	9	3.2		
tỷ1843361.4Itỷ1843361.4Itỷ1182352.1tỷ901846.2tỷ901842.6nɛlθù6432.5koλakɛíaç3332.3nɛlθù11533.2jôţītup12533.2jôţītup12533.2jôţitup12533.2jôţitup12533.2jôţitup12533.2jôţitup12533.2jôţitup12533.2jôţitup12533.2jôţitup12533.2jôţitup12533.2jôţitup12533.2jôţitup12533.2jôţitup1334jotup13135jotup1334jotup1334jotup1334jotup1334jotup1433jotup1434jotup1434jotup1464jotup1434jotup1434jotup14 </td <td>μόριον</td> <td>7</td> <td>7</td> <td>8</td> <td>5.0</td> <td></td> <td>πειθοῦς</td> <td>22</td> <td>6</td> <td>9</td> <td>3.8</td>	μόριον	7	7	8	5.0		πειθοῦς	22	6	9	3.8		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	τὴν	184	33	6	1.4	0	Γοργία	32	6	8	5.5		
$\tilde{\alpha}\lambda\eta$ 4446.2 $\tilde{r}\eta$ 901842.6 $rreiθ\omega$ 6432.5 $rreiθ\omega$ 6432.5 $rreiθ\omega$ 6432.5 $rreiθ\omega$ 11533.2 $\tilde{\rho}\eta\tau\omega\rho$ 12533.2 $\tilde{\rho}\eta\tau\omega\rho$ 1334.4 $\tilde{\rho}\eta\tau\omega\rho$ 1334 $\tilde{\rho}\eta\tau\omega\rho$ 1334 $\tilde{\rho}\eta\tau\omega\rho$ 1334 $\tilde{\rho}\eta\tau\omega\rho$ 1434 $\tilde{\rho}\eta\tau\omega$ 14364 $\tilde{\rho}\eta\tau\omega$ 14364	tñc	118	23	5	2.1		μόριον	80	7	7	5.0		
πτι901842.6πτιθώ6432.5κολακείας332.3κολακείας332.3όριτωρ12533.2όρθῶς31834.4δῶκαστηρίοις432 2 ορθῶς3183 3 2 2 4 5 3 3 2 2 4 5 3 3 2 2 4 5 3 3 2 2 4 5 3 3 2 2 4 5 3 3 2 2 4 5 3 3 2 2 4 5 3 3 2 2 4 5 3 3 2 2 4 5 5 10 1375 205 7 13 13 3 4 8 4 4 2 2 4 7.0 4 3 2 7.3 7.3 7 3 3 3 4.4 7.0 4 3 2 5.0 7.0 7 3 3 3 4.4 7.0 4 3 2 5.0 7.0 7 3 3 3 4.4 4 2 5.0 10	άλλη	4	4	4	6.2		τέχνην	170	9	б	2.4		
nepì30413664.7 $\pi \epsilon i \theta \tilde{\omega}$ 6432.5 $\kappa \delta \lambda \alpha \kappa \epsilon i \alpha \zeta$ 3332.3 $\pi \epsilon i \theta \tilde{\omega} \zeta$ 11533.2 $\dot{\rho} \dot{\eta} \tau \omega \rho$ 12533.2 $\dot{\rho} \dot{\eta} \tau \omega \rho$ 12533.2 $\dot{\rho} \dot{\eta} \tau \omega \rho$ 12533.2 $\dot{\rho} \dot{\eta} \tau \omega \rho$ 325.0 $\pi \alpha \tilde{n} \sigma \sigma m$ $\pi \sigma \sigma \sigma \sigma$ $\pi \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma \sigma \sigma \sigma \sigma \sigma$ $\sigma \sigma $	τñ	90	18	4	2.6		πειθώ	12	4	6	2.5		
κολακείας3332.3πειθοῦς11533.2ἡήτωρ12533.2ἡήτωρ12533.2ἡήτωρ12533.2ἱρθῶς31834.4δικαστηρίοις4325.0ποιῆσση5325.0ποιῆσση5325.0τ7355ποιῆσση535Console X 2 75Console X 2 2 4The Output 3 2 7 πρυting the cooccurrents of <"ἡητορικ.*"> in the Gorgi τὴν133he:107 keywords and 44 cooccurrents mputing the cooccurrents of <"ἡητορικ.*"> in the PLATO ψῆς1436Φῆς143642.5	πειθώ	6	4	3	2.5		περὶ	3041	36	6	4.7		
κολακείας6352.3	κολακείας	3	3	3	2.3		Πώλε	39	5	б	5.6		
παισσος115666.1 $\dot{\rho}\dot{\eta}$ τωρ12533.2 $\dot{\delta}\dot{\rho}\theta\bar{\omega}\zeta$ 31834.4 $\dot{\delta}$ ικαστηρίοις2245 $\dot{\delta}$ ικαστηρίοις432 $\dot{\delta}$ ικαστηρίοις2245 $\dot{\delta}$ ικαστηρίοις2245 $\dot{\delta}$ ικαστηρίοις2245 $\dot{\delta}$ ικαστηρίοις2845 $\dot{\delta}$ ικαστηρίοις2845 $\dot{\delta}$ ικαστηρίοις2052.8 $\dot{\rho}\dot{\eta}$ τορικ $\dot{\bullet}$ 1375205 $\dot{\tau}\dot{\eta}$ 13752052.8 $\dot{\rho}\dot{\eta}$ τορικ $\dot{\bullet}$ 224 $\dot{\mu}$ υχαγωγία2243.5 $\dot{\rho}$ ητορικ $\dot{\bullet}$ 13348.0 $\dot{\tau}\dot{\gamma}$ 38803741.6 $\dot{\delta}$ ημιουργός14343.7 $\phi\dot{\eta}\varsigma$ 143642.5	πειθοῦς	11	5	3	3.2		κολακείας	6	3	5	2.3		
δικαστηρίοις22455.8όρθῶς31834.4δικαστηρίοις2455.8δικαστηρίοις4325.0ποιόσιση5327.3Console $&$ Δικαστηρίοις2245σοιόσιση5325.0ποιόσιση5327.3Console $&$ Διαιότηρίας2845τριμίη13752052.8φήτορα2247.0ψυχαγωγία2243.5όητορικ.*"> in the Gorgi1334τὴν38803741.6δημιουργός14343.7φὴς143642.5	όήτωο	12	5	3	3.2		τέχνης	127	7	5	5. 1		
οροφος 01 0<	όρθώς	31	8	3	1.1		δικαστηρίοις	22	4	5	5.8		
contact plots 4 5 2 7.3 7.3 7.3 7.3 7.3 7.3 7.4 7.2	δικαστηρίοις	4	3	2	5.0		μέλλοντα	53	5	5	1.0		
τη̂ 1375 20 5 2.8 Console X X Y 1375 20 5 2.8 μ Y Y 1375 20 5 2.8 μ Y Y Y 20 5 2.8 μ Y Y Y 20 2 4 7.0 μ Y Y Y 20 2 4 7.0 ψ ψ Y Y 20 2 4 3.5 μ Y Y Y 3880 37 4 1.6 ψ Y 3880 37 4 1.6 5 2.8 ψ Y 3880 37 4 3.7 4 3.7 ψ Y Y Y Y Y 3 4 3.7 ψ Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y	ποιñααι		3	2	73		Γοργίας	28	4	5	5.5		
Console % μ <thμ< td=""><td></td><td>Ar</td><td>10</td><td></td><td>D P</td><td></td><td>τ<u></u></td><td>1375</td><td>20</td><td>5</td><td>2.8</td></thμ<>		Ar	10		D P		τ <u></u>	1375	20	5	2.8		
tem Output pputing the cooccurrents of <"ὑητορικ.*"> in the Gorgi tem Output photopic ând 44 cooccurrents pputing the cooccurrents of <"ὑητορικ.*"> in the Gorgi the PLATO the PLATO	Console 🖾			H E		3	ρήτορα	2	2	4	7.0		
in bot putnputing the cooccurrents of <"ὑητορικ.*"> in the Gorgiin the Gorgiin the Gorgiin the Gorgiin the Gorgiin the PLATOin the PL	tem Output						ψυχαγωγία	2	2	4	3.5		
ne: 107 keywords and 44 cooccurrents τὴν 3880 37 4 1.6 nputing the cooccurrents of <"ῥητορικ.*"> in the PLATO δημιουργός 14 3 4 3.7 ne: 138 keywords and 95 cooccurrents φὴς 143 6 4 2.5	nputing the	e cooccurr	ents of <"òn	τορικ.*"	> in the Gorai	9	ρητορική	13	3	4	8.0		
mputing the cooccurrents of <"ῥητορικ.*"> in the PLATO	ne: 107 key	words and	44 cooccurr	ents	1 12 1121 1200	2	τὴν	3880	37	4	1.6		
Τις. 130 Reywords did 33 coocedirents	mputing the	e cooccurre	ents of <"pŋ	τορικ.*"	> in the PLATO		δημιουργός	14	3	4	3.7		
	nc. 130 Key		55 COCCUT	unts		Φῦς	143	б	4	2.5			

Figure 12. Cooccurrences of ῥητορική in *Gorgias* (left panel) and in the whole Plato corpus (right panel).

In the same fashion, the query of the cooccurrents of ἀδικε.* (which matches both ἀδικεῖσθαι and ἀδικεῖν) (Figure 13) instantly points to the passages where Plato makes the comparison between suffering and doing wrong. It is no surprise that the cooccurrents are ἀδικεῖσθαι (because it is most of the time compared to ἀδικεῖν), ἀδικεῖν (for the same reason), τὸ (because the comparison is between the fact of doing or suffering wrong), αἴσχιον, and κακίον (because in the dialog with Polos, the question is mainly whether it is fouler or more evil to commit or to suffer wrongdoing).

PLATO1707	²LATO170720C: "άδι 🛱 💊 Gorgias: "άδικε.*"%d (10, 10) 🛱							🗬 PLATO170720C: "ἀδικε.*"%d (10, 10) 🕴				
Query: 💉 "	άδικε.*"%d	Query: 🎉	'άδικε.*"%d				Query: 🎢	Query: 🎉 "ἀδικε.*"%d				
hresholds: Fr	nin: 1 🗘 Fm	Cooccurrents	properties:	word Edit	Threshold	ds: Fmin ≥ 2 ‡ C	mi Cooccurrer	ts properties: w	ord Edit Th	nresholds:	Fmin≥2 + Cn	
	< 1 -	Context: 🖲 w	ord 🔿 str	ucture add	÷,	📓 use left Wind	ow Context: 🧕	word 🔿 struc	ture add	÷ 6	🗹 use left Windo	
	3.0											
word I	Frequency	from - 10 ‡	to-0 a	nd from 0 ±	to 10	5	from - 10	to-0 an		0 10 1		
ίδικεῖν	116								CE 189	1.		
ίδικεῖσθαι	46	ac					ID GC		2			
ιδικεί	8	Cooccurrent	Frequency	Cofrequency	▲ Score	Mean distance	Cooccurre	ent Frequency	Cofrequency	A Score	Mean distance	
ίδικεῖς	2	άδικεῖσθαι	34	29	37	3.1	άδικεῖσθα	u 46	35	71	3.1	
άδίκει	1	άδικεῖν	48	31	33	3.2	άδικεῖν	116	40	62	3.2	
ιδικεῖσθαί	1	TÒ	368	49	16	21	αῖσχιον	24	11	19	2.7	
ιδικεΐται	1	σισνιου	18	11	11	27	κάκιον	23	10	17	4.1	
		κάκιου	16	10	11	4.1	τò	7767	82	10	2.7	
		TOD	170	24		4.1	λυσιτελείν	/ 10	5	9	2.8	
		100	1/0	24	0	2.5	άδικοῦντ	a 25	5	7	2.2	
		φαινεται	4	3	5	0.1	δίκην	169	9	6	6.1	
		μαλλον	30	1	3	2.4	άνταδικεί	v 4	3	6	5.7	
		αοικουντα	11	4	3	1.8	διδόναι	64	6	6	6.3	
		οιοοναι	20	5	3	0.0	άκοντας	6	3	5	3.7	
		μη	1/3	15	3	3.7	τοῦ	3919	40	5	2.7	
		ζητειν	2	2	2	5.0	κακουργε	îv 8	3	5	5.0	
		βουλησεται	2	2	2	2.5	άδικοῦντο	ας 11	3	4	5.3	
Console 🕅					1 🗃 🗉	- -	άλλήλους	125	6	4	2.5	
om Output					Lad one		τελέως	41	4	4	5.8	
en output ex of <"άδ	οικε.*"%d> wi	th property:	[word] in	the corpus:	PLAT017	9720C	συνθέσθα	u 3	2	4	2.0	
e: 7 items	s for 175 occ	urrences					βουλήσετ	αι 3	2	4	2.5	
puting the	e cooccurrent	is of <"ἀδικε.	*"%d> in t	he Gorgias (corpus		άντωμοσ	lav 3	2	4	6.5	
puting the	e cooccurrent	s of <"άδικε.	*"%d> in t	he PLAT0170	720C cor	ous	άδικών	19	3	4	4.0	
e: 175 key	words and 70) cooccurrents					μŋ	3140	30	3	3.9	
						11	And	100	6		67	

Figure 13. Cooccurrences of ἀδικεῖσθαι and ἀδικεῖν (cf. complete word forms list on the left) in *Gorgias* (central panel) and in the whole Plato corpus (right panel).

An interesting case arises when cooccurrences in the *Gorgias* happen to be quite different from the cooccurrences in the whole corpus, that is, instances in which a word gets a distinct meaning in the *Gorgias*. This is the case for vóµoç (Figure 14): in the *Gorgias* ὁ vóµoç is mainly used in the discussion with Callicles in the context of the opposition between what is κατὰ vóµov ("according to convention") and κατὰ φύσιν ("according to nature"). In the other dialogs (and mainly in the *Laws*) the cooccurences of vóµoç emphasize the description of what will be the law, or conform to the law (ἔστω κατὰ νόµον), or the political action of the law (κείσθω vóµoς).

Z PLATO1	ို PLATO170720C: "voµ[^۱ႄ ၊ဆ 💊 Gorgias: "voµ[^۱ɛŋ].{0,2}"%d (10, 10) အ							PLATO170720C: "voµ[^เɛŋ].{0,2}"%d (10, 10) 🔀					
Query: 📝	νομ[^ιεη].{0,2}"%α	Query: 🎢	'voµ[^ιε <mark>η].</mark> {0),2}"%d			Query: 🖉 "νομ[^ιεη].{0,2}"%d						
Thresholds	: Fmin: 1 🗘 Fmax: 🛛	Cooccurrents	properties:	word Edit	Thresholds	Fmin≥2‡	Cooccurrents pro	operties: word	Edit Thresh	iolds: Fmi	in≥2‡ Cmin≥		
	< 1 -11/11	Context: 🖲 w	vord 🔿 str	ucture add	÷	🗹 use left Wir	Context: 🖲 word	d 🔘 structure	add	ំ 🛃 ក	se left Window 😡		
word -	Frequency												
νόμους	179	from - 10	to-0-a	nd from 0	to 10 -		from - 10 - to	- 0 - and fro	om 0 = to 1	0 +			
νόμων	152												
νόμον	135	Coccurrent	Frequency	Cofraguangu	· Caara A	(+) tean distance	Concernent	Frequency	Cofraguation	. Crora	Mann distance		
νόμος	130	Cooccurrent	Frequency	Conequency	A SCOLE IN	lean distance	cooccurrenc	Frequency	correquency	- SCOLE	Mean distance		
νόμοις	72	κατα	48	11	10	3.4	κατα	1530	149	38	3.1		
νόμω	60	φυσιν	18	6	6	5.3	τοῦς	2000	139	29	2.7		
νόμου	47	τιθενται	2	2	3	0.	čaru	109	154	17	3.7		
νόμοι	36	φύσις	3	2	3	2.0	εστω	198	35	17	2.8		
νομοΰ	1	λέγη	4	2	2	1.5	προστριον	23	14	10	3.2		
νομός	1	φύσεως	4	2	2	6.5	REIOOW	5055	271	14	3.2		
νόμω	1	νόμον	6	2	2	6.0	notine	0055	2/1	14	5.9		
15	14	γίγνονται	7	2	2	2.5	πολιτείας	90	21	13	5.2		
		καλά	7	2	2	5.5	tov	3305	104	12	4.1		
		έπὶ	51	4	2	3.2	ä Se	112	132		3.0		
		έὰν	82	5	2	4.0	θέσειμε	112	19	9	2.4		
		αύτοὶ	10	2	2	8.5	0202ως	10	140	8	.0		
		φύσει	10	2	2	7.5	- OI	3023	149	0	4.5		
		1.00		15 50		38	0	3033	138	7	3.4		
							εύτοις	533	3	7	3.2		
							μοδοίο	555	40	7	4.1		
							μησεις	000	54	6	4.5		
		(*C				(4 CC	LOUTON	908	26	0	4.7		
	53			1	FR -		ac .	202	20	6	5.5		
System Out	nut			ur A			νομοθέτος	57	11	6	6.2		
Index of	<"νομ[^ιεη].{0,2}"%	d> with prope	rty: [word] in the cor	ous: PLATO	0170720C	τιθένοι	27	0	6	2.6		
Done: 11	items for 814 occur	rences	(0. 0) #0.	in the c			θόσει	21	0	0	2.0		
Computing	the cooccurrents o	<pre>T <"νομ[^ιεη].</pre>	.{0,2}"%d>	in the Gorg	Las corpus	5	sic	110	5	0	2.0		
Computing	the cooccurrents o	f <"νομ[^ιεη].	.{0,2}"%d>	in the PLAT	0170720C d	orpus		260	15	0	3.5		
Done: 814	keywords and 323 c	ooccurrents					nept	300	28	2	5.2		
						100					10.61		

Figure 14. Cooccurrences of vó μ o ς (cf. complete word forms list on the left) in *Gorgias* (central panel) and in the whole Plato corpus (right panel).

3.4 Computing corpus-based paradigmatic series

Another way of using the search engine is to build a list of words or patterns that share some constitutive or contextual feature. For instance, one could list all the lexical units including the same given morphological unit, or list all units occurring in some precise position (words ending verses, adjectives qualifying a given noun).

Schiappa emphasized "Plato was a prolific coiner of words ending with -ική denoting 'art of'" (Schiappa 1990:464). We can have a look at our data to get the set of these kinds of words (Figure 15).

PLATO1707200	::".*ική":word 🖾	- g
uery: 🇪 📧	5	Properties: word Edit Search
resholds: Fmin	1 🗘 Fmax: 99999999	🗘 Vmax: 9999999 🗘 Page size: 100 🗘
		Labo und fining financial
	<pre>[<] < 1 -507 50 ≥</pre>	
word	Frequency	
ίατρική	17	
ϸητορική	11	
γυμναστική	6	
μιμητική	5	
μουσική	5	
λογιστική	4	
σκυτοτομική	4	
ὑπηρετική	4	
πολεμική	3	
πολιτική	3	
σοφιστική	3	
Κρητική	2	
αύλητική	2	
βασιλική	2	
γραφική	2	
διακριτική	2	
μετρητική	2	
στρατηγική	2	
τεκτονική	2	
άριθμητική	2	
έμπορική	2	

Figure 15. Index for the query .* $\kappa \dot{\eta}$ in the 29 texts of Plato, results for a minimum frequency of 2.

In section 3.1 above, we noted that in the *Gorgias*, Socrates frequently uses the pronoun $\sigma \dot{v}$ with verbs of saying, and $\dot{\epsilon}\gamma \dot{\omega}$ with verbs expressing his own position. We can get a rough but systematic summary of verbs more frequently used with $\dot{\epsilon}\gamma \dot{\omega}$ and $\sigma \dot{v}$ in the Gorgias by computing their cooccurrences in a narrow context window (5 words right and left) (Figure 16).

	👂 Gorgias: "ἐγὼ"%d (4, 4) 🕴				🗬 Gorgias: "σὺ"%d (4, 4) 🖾				
Query: 🎉 "έγὼ"%d				Query: 🔊 🐨 où "%d					
ooccurrents pro	operties: w	vord Edit T	hresholds	: Fmin≥2‡ Cm	Cooccurrents	properties:	word Edit	Threshold	ls: Fmin ≥ 2 ‡
ontext: 🖲 word	d () struc	from 0 + to	:) 0 4 :	🧭 use left Windov	Context: 🖲 w	ord () stru	d from	: to 4:	🥑 use left Wi
()))))))))))))))))))									
Cooccurrent F	requency	Cofrequency	▲ Score	Mean distance	Cooccurrent	Frequency	Cofrequency	▲ Score	Mean distance
λέγω	64	18	8	1.3	φής	26	12	9	1. 0
οὕτ'	16	8	6	1.8	φής	9	6	6	.5
έρῶ	9	6	5	1.2	λέγεις	91	15	4	1.1
φημι	20	8	5	.5	οὕτ'	16	6	4	1.7
ἕλεγον	29	9	5	.0	οἴει	25	7	3	.7
οίμαι	47	11	4	1.1	η̈ν	13	5	3	.8
σοι	116	18	4	1.1	ώμολόγεις	4	3	3	1.0
σοῦ	34	8	3	1.4	ώσπερ	69	11	3	.8
οἶδα	13	5	3	2.0	νῦν	77	11	2	1.6
καλῶ	8	4	3	1.2	à	58	9	2	1.7
õ	45	8	2	1.0	κελεύεις	2	2	2	0.
ένθάδε	6	3	2	2.3	έθέλων	2	2	2	2.0
δτι	214	21	2	2.0	Έρώτα	2	2	2	2.5
ποιῶ	2	2	2	1.5	ἕλεγες	13	4	2	.2
συνίημι	2	2	2	1.0	ů	281	25	2	2.7
ύπολαμβάνω	2	2	2	1.0	ών	52	8	2	.5
πάθοιμι	2	2	2	1.5	δὲ	354	29	2	1.4
άποκοινοῦμαι	2	2	2	2.5	φίλε	8	3	2	2.3
	1081	74	2	1.6	ήyñ	8	3	2	1.3
μέν	236	22	2	1.4	μ̈́ου	3	2	2	.5
ဝံဂမယ်င	31	6	2	2.3	δέξαιο	3	2	2	3.0
ดมัง	168	17	2	1.6	όμολογήσης	3	2	2	1.5
ຕນ້	12	7	2	1.0	μὰ	17	4	2	2.5

Figure 16. Cooccurrences of $\dot{\epsilon}\gamma\dot{\omega}$ and $\sigma\dot{\upsilon}$ in Plato's Gorgias.

Another kind of paradigmatic set can be computed on the basis of textual structures. For instance, we can have a look at every one-word answer in the corpus, and thus explore the different ways in Plato's dialogs to express agreement or disagreement (Figure 17).

iery: 🗡 (<s< th=""><th>aid>[][]</th><th><sp>[][]</sp>) Properties: word Edit Search</th></s<>	aid>[][]	<sp>[][]</sp>) Properties: word Edit Search
resholds: Fmir	n: 1 🗘 Fmax: 🦻	9999999 🗘 Vmax: 9999999 🗘 Page size: 100 🗘
	< < 1 -100/1	72 > > > Tarra c1377, V172, rmin1, rmax43
word	Frequency	
vaí.	430	
ἕγωγε.	87	
πῶς;	72	
φαίνεται .	68	
οὕτως.	50	
όρθώς.	47	
άνάγκη.	43	
ἕοικεν.	41	
ούδαμῶς.	32	
άληθή.	30	
φημί.	27	
άληθέστατα.	27	
ἕμοιγε .	26	
ίσως.	21	
π <u>ĝ</u> ;	20	
όρθότατα.	17	
κινδυνεύει .	16	
καλῶς.	15	
ούδέν.	14	
δήλον.	12	
έστιν.	12	

Figure 17. Index of one-word answers.

23

But the Plato TXM corpus we are using here does not reveal all the possibilities given by this kind of query. A more precise investigation could be done on a tagged corpus. Let us have a quick look to two other examples taken outside of *Gorgias*.

Our first example deals with morphosyntactic annotation. The *Euthyphro* corpus was built from the TreeBank AGDT2 and has morphosyntactic tags, so we can list the verbs occurring in the same sentences as $\pi \alpha \tau \eta \rho$ (Figure 18).

PLATO170504B: [postag="n.*"]:lemm	a 🛛 🕅 pater_senter	ices: [postag="v.* ⊠	🛄 tlg0059.tlg001.perseus-grc1.tb - 4 🖾			
uuery:	Query: P [p] Thresholds: Fm	ostag="V.*"] in: 1 ÷ Fmax: 9999 < < 1 -58/58 >	τὸ ὅσιον καὶ τί τὸ ἀνόσιον ; [0] λέγω τοίνυν ὅτι τὸ μὲν ὅσιόν ἐστιν ὅπερ ἐγὼ νῦν ποιῶ, τῷ ἀδικοῦντι ἢ περὶ φόνους ἢ περὶ ἰερῶν κλοπὰς ἤ τι ἄλλο τῶν τοιούτων ἐξαμαρτάνοντι ἐπεξιέναι, ἐάντε πατὴρ ῶν τυγχάνῃ ἐάντε μήτηρ ἑάντε ἄλλος ὀστισοῦν, τὸ δὲ μὴ ἐπεξιέναι ἀνόσιον · [0]			
))))	έπεί, ὦ Σώκρατες, θέασαι ὡς μέγα σοι ἐρῶ τεκμήριον τοῦ νόμου			
lemma Frequency	lemma	Frequency	οτι ουτως εχει- ο και αλλοις ηση είπον, οτι ταυτα ορθώς αν είη ούτω γινιόμενα- μὴ έπιτρέπειν τῷ ἀσεβοῦντι μρδ ἂν ὁστισοῦν			
θεός 58	ειμί	9	τυγχάνη ών.			
Σωκράτης 41	ποιέω	7	αὐτοὶ γὰρ οἱ ἄνθρωποι τυγχάνουσι νομίζοντες τὸν Δία τῶν θεῶν			
Εὐθύφρων 38	ἐπέξειμι	5	άριστον καὶ δικαιότατον, καὶ τοῦτον ὁμολογοῦσι τὸν αὑτοῦ			
δίκη 18	λέγω	4	πατερα οησαί ότι τους θείς κατεπίνεν ουκ εν οική, κακείνον γε			
πατήρ 16	τυγχάνω	4	έμοι δε χαλεπαίνουσιν ότι τῷ πατρι έπεξέρχομαι ἀδικοῦντι, και			
άνθρωπος 12	διδάσκω	3	οὕτως αὐτοὶ αὐτοῖς τὰ ἐναντία λέγουσι περί τε τῶν θεῶν καὶ			
λόγος 11	συνδέω	3	περὶ ἐμοῦ.			
Ζεύς 10	ἕχω	3				
PLATO170504Β:[lemma="πατήο"] &						
wany (%) [lamma "nerta"]			Konned used Edite			
			Keyword: word Edit Search			
ort keys: #1 Left conte 🛟 #2 None	e 🗘 #3 None	\$ #4 None \$	Sort			
K.		< < 1 -16/16	i > > Hide setting:			
text_id v		Left context	Keyword Right context			
tlg0059.tlg001.perseus-grc1.tb	, κάκεί	νόν γε αὖ τὸν αὑτοῦ	πατέρα έκτεμεῖν δί ἔτερα τοιαῦτα · έμοὶ δὲ χαλεπαίνουσιν ὅτι τῷ			
Henoro Henori a assaus essi th	διασθείοοντικ	μέ τε καὶ τὸν αὐτοῦ	πατέρα , έμε μεν διδάσκοντι, έκεινον δε νομθετούντι τε και			
Ligouss.Ligou i.perseus-grc i.co	σιαφυειροτιτί	perentar con acces	inaccha () che her ore active to the to be			

Figure 18. Verbs used with πατήρ in *Euthyphro*. (i) (upper left) search for most frequent nouns in the text (lemmas); (ii) (lower) contexts of πατήρ in a concordance view; (iii) (upper right) widening context in a page view; (iv) (upper central) list of verbs (lemmas) in sentences containing πατήρ, sorted by descending frequency.

Obviously, all encoded information can be used to define what will be returned. Our second example uses semantic information. In our Plato corpus, one text (the *Phaedo*) has been tagged for named entities; we can use this annotation to see precisely which places or people are mentioned in *Phaedo* (Figure 19).

₽ Phaedo: <name>[]+</name> :w 🛛		I Phaedo: <persname>[]+<th colspan="3">III Phaedo: <placename>[]+</placename></th></persname>			III Phaedo: <placename>[]+</placename>		
Query: 🖉 <n< td=""><td>name>[]+</td><td>Query: 🖉 <</td><td>persname>[]+<td>ersname></td><td colspan="3">Query: 🖉 <placename>[]+</placename></td></td></n<>	name>[]+	Query: 🖉 <	persname>[]+ <td>ersname></td> <td colspan="3">Query: 🖉 <placename>[]+</placename></td>	ersname>	Query: 🖉 <placename>[]+</placename>		
Thresholds: Fmi	in: 1 + Fmax: 99995	Thresholds: Fm	iin: 1 ‡ Fmax: 🧐	9999999	Thresholds: Fmin:	1 ‡ Fmax: 99999999 ‡	
(4C m) D				((C ····)))))))))))))))))))))))))))))))		
word	Frequency	word	Frequency	0	word	Frequency	
Άθηναῖοι	3	Κέβης	82		Δῆλον	2	
Άθηναίων	2	Σώκρατες	65		Πυριφλεγέθοντα	2	
Άχερουσιάδα	2	Σιμμίας	38		Πυριφλεγέθοντι	2	
Αὕριον	1	Σωκράτης	35		Alyivn	1	
Βαβαί	1	Σιμμία	34	-	Αἰγύπτω	1	
Βοιωτούς	1	Κρίτων	16		Δήλου	1	
Θηβαϊκής	1	Άιδου	15		Δῆλόν	1	
Θηβαΐε	1	Δία	12		Εὐρίπω	1	
Θηβαῖος	1	Φαίδων	12		Κρήτην	1	
Παιανιεύς	1	Σωκράτους	8		Κωκυτόν	1	
Στύνιον	1	Σιμμίαν	7		Μέγαρα	1	
Φλειασίων	1	Έχέκρατες	7		Μεγαρόθεν	1	
Άθηναίοις	1	Σωκράτη	6		Σικελία	1	
AOVEIO	1	Τάρταρον	6		Στύγα	1	
Άγερουσιάδι	1	Σιμμίου	5		Άθήναζε	1	
Άγερουσιάδος	1	Κρίτωνα	4		"Άτλαντα	1	
Ηοσκλείων	1	Δi *	3		Έλλάς	1	
ໄດ້ໄຂດານ	1	Εὐήνω	3		οδυσσεία	1	
TUNCUV	4	Εὔηνος	3	÷.			

Figure 19. Index of named entities encoded in the Perseus edition of *Phaedo*.

3.5 Local contrastive analysis of a corpus: Identifying what is typical in a part

Studying the vocabulary of *Gorgias*, we have already shown that the specificity measure can be used according to two points of view: for a word (ex. $\dot{\rho}\eta\tau\sigma\rho\iota\kappa\dot{\eta}, \dot{\epsilon}\gamma\dot{\eta}, \sigma\dot{\upsilon}$) we can draw its usage profile among texts; and for a text, we can point out the words that are statistically overused in this text in comparison to the rest of the corpus. This way, it is possible to study and compare every division of the corpus. For example, if we have a hypothesis that a corpus is divided into four main parts (be it text types, time spans, streams, etc.), we have a tool to automatically extract words that could help grounding and exploring this hypothesis.

As a complement to statistical processing, another way to look at the particularities of the *Gorgias*' vocabulary is by simply listing the words that appear only in Gorgias³³ (Figure 20).

³³ In TXM, the table used is the one produced by computing the specificities on the *Gorgias* subcorpus

Units	Frequency T 613406	Gorgias t=30870	score	▼ PLATO170720C \ Gorgias
Καλλίκλεις	62	62	80.5	0
Πῶλε	39	39	50.6	0
Γοργία	32	32	41.5	0
πῶλος	12	12	15.6	0
ϸητορικήν	11	11	14.3	0
πιθανώτερος	7	7	9.1	0
Καλλικλῆς	6	6	7.8	0
Πώλον	6	6	7.8	0
όψοποιικὴ	5	5	6.5	0
κόρρης	4	4	5.2	0
έλέγχου	4	4	5.2	0
έπιψηφίζειν	4	4	5.2	0
έροῦ	4	4	5.2	0
δημηγορία	3	3	3.9	0
διδούς	3	3	3.9	0
ηὑρίσκομεν	3	3	3.9	0
κάεσθαι	3	3	3.9	0
προσφέρει	3	3	3.9	0
άπαλλαττόμενος	3	3	3.9	0
άποκτενεί	3	3	3.9	0
άφαιρήσεται	3	3	3.9	0
Άρχέλαος	3	3	3.9	0
έάσεις	3	3	3.9	0
έλεγές	3	3	3.9	0
έλεγχε	3	3	3.9	0
όψοποιία	3	3	3.9	0
όμολογήσης	3	3	3.9	0
4(1	<u>l</u>	515	· · · · · · · · · · · · · · · · · · ·

- ,**-**

i^l Gorgias: word 🖾

Figure 20. Word forms used only in Plato's *Gorgias*, with a minimum frequency of 3 (null frequency in all other texts of the Plato corpus).

For instance, putting aside proper names, the word-form $\dot{\epsilon}\pi_i\psi\eta\phi$ ($\zeta\epsilon_iv$ (to put a question to the vote) has 4 instances in Plato, all of them in *Gorgias*—to which we should add one instance of $\dot{\epsilon}\pi_i\psi\eta\phi$ ($\zeta\omega v$ (476a). Even if the term is rather technical, *prima facie* this result might be surprising, given the fact that Plato is known as a critic of Athenian democracy and of the fact that the citizens make political decisions without any expertise, and the verb $\dot{\epsilon}\pi_i\psi\eta\phi$ ($\zeta\epsilon_iv$ precisely describes the democratic process of putting a question to the vote in a democratic assembly (see e.g. *Thucydides II* 24). But, if we go back to the text, we can observe that in *Gorgias*

those instances of the lemma $\dot{\epsilon}\pi_i\psi\eta\phi\dot{\zeta}\omega$ do not intend to give criticism of the democratic process; rather, they are a reference to the fact that Socrates does know how to put a question to a vote because "there is also one whose vote I know how to take, whilst to the multitude I have not a word to say" (474a). Hence, the choice of $\dot{\epsilon}\pi_i\psi\eta\phi\dot{\zeta}\epsilon_iv$ in *Gorgias* seems coherent with the project to show the opposition between the rhetorical discourse addressed to the crowd in order to obtain the vote in the Assembly and the philosophical dialog with a sole person in order to decide if the thing in question is true or false. Thus, even if *Gorgias* is full of the insinuation that democracy ruined Athens, those mentions entail, not a real critique of democracy, but an opposition between philosophical and democratic discourse.

Another word form occurring only in *Gorgias* is $\partial \psi o \pi o \iota \kappa \dot{\eta}$ (scil. $\tau \dot{\epsilon} \chi v \eta$, the art of cookery), which is not a common word in ancient Greek. If we consider all the forms of this word,³⁴ Plato uses it once in the *Symposium* (187e), when the physicist Eryximachus pronounces that his craft "set high importance on a right use of the appetite for the dainties of the table, that we may cull the pleasure without the disease." But in *Gorgias* the word occurs 7 times, mainly in the well-known passages where he makes a comparison between rhetoric and the art of cookery, precisely to show that neither are arts, but kinds of flattery (Figure 21).

³⁴ Query: ὀψοποιικ.*

🗐 tlg0059_tlg023_per	seus-grc2 - 20 🖾							
				. 8				
				11				
		<	465>					
είναι τὸ τοιοῦτον, ἰ οὐδένα ψ προσφέ ἀμφισβητεϊς, ἐθέλι κακοῦργός τε καὶ ἀ τοῦ διὰ τῆς γυμνασ σοφιστικὴ πρὸς να φύρονται ἐν τῷ αὐ σώματι ἐπεστάτει, πὸς αὐτό, τὸ τοῦ) ὑγιεινῶν καὶ ὄψοπ οἰκ ἑῶν μακροῦς ἰ ἀποκρίσει ῆν σοι ἀ	ὑ Πῶλε — τοῦτο γὰρ πρὸς σὲ λέγω — ὅτι τοῦ ἡδέοι seι ἂ προσφέρει ônοι" ἄττα τὴν φύσιν ἐστίν, ώστε τ ω ὑποσκείν δόγον. τὴ μέν οὐν ἰατρική, ὥσπερ λέγω πατηλὴ καὶ ἀγεννὴς καὶ ἀνελεύθερος, σχήμασιν καὶ χ τικῆς ἀμελείν. Ἐν' οὐν μὴ μακρολογῶ, ἐθέλω σοι είπε μοθετικήν, καὶ ὅτι ὅ ὑψοποική προζ ἱατρικήν, τοῦ τῶ καὶ περὶ ταὐτὰ σοφισταὶ καὶ ῥήτορες, καὶ οὐκ ἔχ ἀλλ' αὐτὸ αὐτῷ, καὶ μὴ ὑπὸ ταὐτης κατεθεωρείτο κ ἀναξαγόρου ἀν πολῦ ἡν, ὡ φίλε Πῶλε — σὺ γὰρ τοἱ οικῶν. ὅ μὲν οὐν έγώ φημι τὴν ῥητορικὴν είναι, ἀκή λόγους λέγειν αὐτὸς συχνὸν λόγον ἀποτέτακα. ἄξιο πεκρινάμην οὐδὲν οἰος τ' ἡσθα, ἀλλ' ἐδἑου διηγήσεω	ς στοχάζεται ἄ την αίτίαν έκάα μόμασινκαί λ μόμασιν καί λ μόμασιν καί λ το άρτορική π ιουσιν ότι χρής το ότι χρής το άλεκρόγιετο i μοτών έμπειρος μοας - άντίστρ γ μὲν οὖν έμοὶ λς.	νευ τοῦ βελτίστου · τέχνην δὲ αὐτὴν οῦ φημι είναι ἀ ττου μὴ ἐχειν είπειν. ἐγὼ δὲ τέχνην οὐ καλῶ ở ἀν ἡ ἀ κολακεία ὑπόκειται · τή δὲ γυμναστικῆ κατὰ τὸν αι ειότητι καὶ ἐσθῆσιν ἀπατῶσα, ὥστε ποιεῖν ἀλλότριον ωμέτραι — ἦδη φὰ ἂν Γίσως ἀκολουθήσαις — ὅτι ὃ κκ κρός δικαιοσινήνν. ὅπερ μέντοι λέγω, διέστηκε μὲν σονται οῦτε αὐτοὶ ἐαυτοῖς οῦτε οἱ ἄλλοι ἄνθρωποι το ὅ τε ἀψοποικῆ καὶ ἡ Ιατρική, ἀλλ' ἀὐτὸ τὸ σῶμα ἕκρ το ἀψοποικῆ καὶ ἡ Ιατρική, ἀλλ' ἀὐτὸ τὸ σῶμα ἕκρ κοφον ὀψοποιίας ἐν ψυχῆ, ὡς ἐκεῖνο ἐν σώματι. ἴσω ι συγγνώμην ἔχειν ἐστίν · λέγοντος γάρ μου βραχέα	άλλ' έμπειρίαν, ὅτι ούκ ἔχει λόγον ἰλογον πράγμα - τούτων δὲ πέρι εἰ ἰτὸν τρόπον τοῦτον ἡ κομμωτική, κάλλος ἐφελκομένους τοῦ οἰκείου ͻμμωτικὴ πρὸς γυμναστικήν, τοῦτο οἰτω φύταει, ἀτε δ' ἐγψιὸ ὄντων ὑίτοις καὶ γὰρ ἄν, εἰ μὴ ἡ ψυχὴ τῷ ινε σταθμώμενον ταἰς χάρισι ταἰς ρίτων ὅντων τῶν τε ἰστρικῶν καὶ ς μὲν οὖν ἄτοπον πεποίηκα, ὅτι σε ι οὐκ ἐμάνθανες, οὐδὲ χρῆσθαι τῆ				
ΣΩ.								
έὰν μὲν οὖν καὶ	έὰν μὲν οὖν καὶ							
default	в	(1) 20 /	82 🕑 📵					
📱 PLATO170720C:"όψ Query: 🗪 όψοποιι	иопонк.*" 12 к.*			Keyword: word Edit Search				
sort keys: #1 None	\$ #2 None \$ #3 None \$ #4	None	\$ Sort					
× 🖉		< 1 -8	8/8 > >	Hide settings				
ref	Left context	Keyword	Right context	1				
Symposium, s. 0187e	τῇ ἡμετέρᾳ τέxνῃ μέγα ἕργον ταῖς περὶ τὴν	όψοποιικὴν	τέχνην έπιθυμίαις καλῶς χρῆσθαι, ὥστ΄ ἄνευ νόσ	ου τὴν ἡδονὴν καρπώσασθαι.				
Gorgias, s. 0463b	άλλα μόρια είναι, ἒν δὲ καὶ ἡ	όψοποιική	• ὃ δοκεῖ μὲν εἶναι τέχνη, ὡς δὲ ὁ ἑμὸς λόγος					
Gorgias, s. 0464d	., s. 0464d εἶναι. ὑπὸ μὲν οὖν τὴν ἱατρικὴν ἡ ὁψοποιικὴ ὑποδέδυκεν, καὶ προσποιεῖται τὰ βέλτιστα σιτία τῷ σώματι εἰδέναι, ὥστ΄							
Gorgias, s. 0465b	μὲν οὖν ἰατρικῆ, ὥσπερ λέγω, ἡ	όψοποιική	κολακεία ὑπόκειται · τῇ δὲ γυμναστικῇ κατὰ τὸν α	ιύτον τρόπον τοῦτον ἡ				
Gorgias, s. 0465c	τοῦτο σοφιστικὴ πρὸς νομοθετικήν, καὶ ὅτι ὃ	όψοποιικὴ	πρὸς ἱατρικήν, τοῦτο ῥητορικὴ πρὸς δικαιοσύνην	. ὅπερ μέντοι λέγω,				
Gorgias, s. 0465d	orgias, s. 0465d μὴ ὑπὸ ταύτης κατεθεωρεῖτο καὶ διεκρίνετο ἤ τε ὁψοποιικὴ καὶ ἡ ἱατρική, ἀλλ' αὐτὸ τὸ σῶμα ἔκρινε σταθμώμενον ταῖς xάρισι							
Gorgias, s. 0465d	άκρίτων ὄντων τῶν τε ἰατρικῶν καὶ ὑγιεινῶν καὶ	όψοποιικῶν	. ὃ μὲν οὖν έγώ φημι τὴν ῥητορικὴν εἶναι, ἀκήκοα	ς.				
Gorgias, s. 0500e	λέγειν. ἕλεγον δέ που ὄτι ἡ μὲν	όψοποιική	οὕμοι δοκεῖ τέχνη είναι άλλ' έμπειρία, ἡ δ' ἱατρικ	ή, -				

Figure 21. Concordance of ὀψοποιική in the Plato corpus.

This specific use of ὀψοποιική has to be compared with the more common ὀψοποιάα and ὀψοποιός, which appear in *Euthydemus* (290b), *Republic* (373c), and *Theaetetus* (178d), but mainly, once again, in *Gorgias* (6 instances, with 3 forms of ὀψοποιός). The frequency of ὀψοποική in *Gorgias* has to be linked with the strategy already mentioned for the word "rhetoric" and more generally for words ending with -ική (section 3.4). The TLG gives Plato (*Gorgias* and *Symposium*) and Xenophon's *Oeconomicus* as the first instances of the term in Greek. According to the scholarship, the date of composition for Plato's *Gorgias* is 385–380 (Marchand and Ponchon 2016:19), and for the *Oeconomicus* 362; there is also relative agreement that the *Symposium* is later than *Gorgias*. These claims are obviously mere hypotheses because of the lack of textual and external information about the date of composition for those texts. However, it seems that the specificity in *Gorgias* of ὀψοποική, which appears when Socrates is giving a definition of rhetoric, could be an argument in favor of Schiappa's hypothesis on the platonic origin of rhetoric. It would give also a humorous tone to the definition, if it is true that Socrates compares the emphatic new word to describe the "art" of Gorgias (so-called "rhetoric") with an emphatic new word to describe the "art" of a cook (463b)!

3.6 Overall contrastive analysis of a corpus: Identifying the main dimensions structuring a corpus

Last but not least, for an overall view of the corpus, correspondence analysis is a multidimensional statistical tool, which computes the main dimensions of contrast structuring a corpus (see technical appendix 5.2).

We have generated such an analysis on the Plato corpus. We focused on the 200 most frequent words, which are mainly grammatical words. Each text is represented by the frequencies of its use of these words, which makes a kind of grammatical or stylistic profile (few lexical words). As explained in section 5.2, the x-axis and y-axis represent complex quantitative "mixtures" of words, and they are used to select the best 2D-perspective in the geometric representation of the data. The map (Figure 22) illustrates the relative positions of texts among one another, the main structural associations and oppositions they draw.





The main opposition we observe in the corpus is a contrast between, on the right-hand side of the map, dialog and interaction markers (ἔφη, ὦ, ἐγώ, Σώκρατες, ὅτι, μοι, σοι, εἰ, ἀλλὰ, ἔγωγε, oὐ, ὥσπερ, γάρ, πάνυ) and, on the left-hand side, grammatical words more associated with nouns, and then descriptive, written style (δὲ, τῶν, κατὰ, δὴ, τῆς, τὴν, εἰς, τὰς, μὲν, ὅσα, τοῖς). This written style is typical of *Laws, Timaeus, Critias*, and *Statesman*. Texts are more heterogeneous as concerns dialog and interaction; the main texts concerned are *Euthydemus*, *Gorgias, Meno, Hippias Major, Charmides, Lysis, Alcibiades 1, Protagoras*, and *Euthyphro*. Other texts are less concerned with this opposition; they may mix markers or use few of them.

Other correspondence analyses could produce different insights into the corpus: for instance, we could focus on a lexical characterization instead of a grammatical one, and try to

³⁵ Red labels emphasize texts that are best represented on this map (their quality indicator, computed as the sum of squared cosine for axes 1 and 2, is greater than 0.25).

produce a map more related to semantic and main topics. If we had morphosyntactic information, we could choose to rely on adjectives, or on verbs, as new prisms through which the corpus can be split. We could also study our corpus from the point of view of a given lexical field and its implementation throughout the texts.

4. Conclusion

4.1 Textometry's relevance for research in the Humanities

Textometry (Lebart, Salem, and Berry 1998) can be seen as a relevant approach for Humanities research, as analysis is directly grounded in texts, not necessarily mediated by external linguistic or semantic resources, which may not be fully appropriate for the corpus and thus could bias what can be seen and found. Information is, above all, taken directly from the corpus, texts, and contexts, and does not depend on available resources, which might not be precisely adjusted to every kind of data. Lexicographical resources can be used anyway, and can add valuable information, but they do not play a critical role; one does not rely on them to access and analyze the texts. The corpus can be seen, not only through an external lexicon, but also through the words it actually contains and the way they are used. This is the first important reason to be interested in textometry: texts and corpus come first, and they are a core foundation during the whole process. The corpus is the main source of information about the texts it includes, and the way those texts use words. Moreover, textometry takes the corpus as it is: one does not have to remove unknown words; one is not compelled to normalize word forms.

A second feature of textometry is that it is not an automatic approach. In a textometric analysis, the computer does not replace the researcher, it does only what it is best at: storing and processing—that's all. Of course, processing can be complex, and it often goes much further than simple counting: as shown above, textometric functions implement algorithms, score tests, and perform complex statistical functions and elaborate visualization processes.

Actually, computers are dedicated to such intensive calculations, the very kinds of tasks for which textometry uses them. Even if a computer does a great job due to its memory and processing ability, even if it allows statistical tests or analytic procedures that would otherwise be impossible, the researcher controls all aspects of the investigations, and bears ultimate responsibility for the relevance and interpretation of computed results.

While the corpus determines the context of observations and acts as a reference concerning word frequencies, its composition significantly proceeds from a human hand and a scientific

decision, not from an automatic production. This sheds light on the *quality* of the corpus (the corpus elicits interest, the researcher is familiar with it, it is carefully composed) instead of on its *quantity* (of course, a small corpus may not need any computational tool, but the hugest return of harvested data does not give any guarantee of meaningful results either).

Once the corpus has been defined, the researcher keeps on driving the analysis, finding entrance points and giving sense to the results produced by queries and statistics. Textometry is based on a strong methodology; it offers a selective choice of tools that are most relevant for textual data, but there is no unique or predefined path to get results, no unique reading of a corpus. One cannot say, "let's just try what textometry tells us about this corpus," because there is not a given output for a given input, and even the input is a considered matter.

As shown in our examples, textometry combines quantitative and qualitative processing. Statistics or basic heuristics are defined that make sense on textual data (see section 5, technical appendix). Even qualitative KWIC concordance view is specifically designed to emphasize linguistic properties of the data. KWIC view is not just an exhaustive compilation of extracted contexts containing a given keyword. A textometric concordance combines several kinds of contextual displays: a tabulated view with context sorting, so as to reveal close contextual patterns, associated with references indicating useful upper-level metadata; and a page view in a full edition, providing all the graphical and typographical clues for reading and interpretation.

In such an analytic framework, textual editions can still meet requirements for textual studies in the Humanities, according to the researcher's experience that reading, analyzing, and editing, are not separate activities. TXM software, for example, can work on TEI encoded corpora, display fine HTML editions, and manage several aligned versions of the same text, including multimedia capture of the original source (for instance pictures of manuscripts).

4.2 Experiencing textometry on new corpora

The purpose of this paper was not primarily to establish new scientific results about Plato's *Gorgias*, but it aims to introduce the classicist scientific community to the textometric approach to digital studies. Textometry could be characterized as a both qualitative and quantitative analysis methodology. Behind a detailed typology of queries that could be searched for in the corpus (queries about word frequency, syntagmatic or paradigmatic uses of word meaning in the corpus, word evolution, texts' contrastive characterization and corpus internal structures),

the key idea is that it is possible in a digital context to elaborate tools combining advanced computational analysis and philologic attention and sensibility towards text integrity and richness.

We hope that this approach can become a personal experience for many colleagues, since several applications implement the textometric ideas promoted here. Our example has been realized with TXM open-source software, which is available for multiple operating systems (including a web portal version), most languages (including Latin and ancient Greek), and many corpus encoding states (from raw text corpora to TEI encoded ones). It also gives all the resources to put into TXM any corpus built from the open Perseus Digital Library.

Acknowledgments

We are grateful to our two reviewers for their accurate comments and stimulating suggestions.

5. Technical Appendix: More Information about ThreeTextometric Processes

5.1 Specificities: A statistical computation to find keywords

The specificity score (Lebart, Salem, and Berry 1998) is an application of Fisher's exact test to textual data (Gries 2012). Specificity analysis allows one to identify which words are specifically overused and underused in a part of the corpus, compared to its use in the whole corpus. It is like a keyword analysis in some textual analysis programs, but instead of using a log-likelihood, t-score, z-score, or tf.idf measure, it implements Fisher's exact test, which is known as the most accurate measure for words' frequency distributions (Gries 2014; McEnery and Hardie 2012).

Based on a hypergeometric probability model, this analysis provides either a positive or negative specificity score. A *positive* score indicates the order of magnitude of the probability of a word *w* appearing *f* times *or more* than *f* times in a part containing *n* words, given that *w* appears *F* times in whole corpus of *N* words. A *negative* score is given when the frequency is lower than expected on a random basis; the measured probability is then the one for a word appearing *f* times *or less* than *f* times, given its total frequency *F*, and part and corpus sizes (*n* and *N*). Specificity scores equal to or higher than 3 (1 chance in 1,000 to obtain the frequency f or more if the words were randomly distributed among parts) or lower than -3 (1 chance in 1,000 to obtain the frequency f or botain the frequency f or less randomly) are considered significant.

Figures 6, 7, 9, and 20 show examples of specificities outputs, which point out lexical choices of some texts within Plato's work.

5.2 Correspondence analysis: A geometrical optimization to get a wordbased map of the corpus

Map visualization of the corpus is based on correspondence analysis, a multivariate statistical tool. The idea behind correspondence analysis may be explained in a few words. Every text is represented according to the words it uses: geometrically speaking, each text is a point and gets a unique location in a multidimensional space in which each word is an axis. The coordinate of a text point on the w word axis is related to the frequency of the w word in the text. If two texts have many words in common and use them with similar frequencies, then their points get close locations in space. Mathematical transformations are then used to build a new set of axes for this space, with new worthwhile properties. The new axes combine the previous word-axes (each axis is a linear combination of word-axes) so that: (i) all the information is kept (points representing texts keep their distances to one another, the shape of the "text-cloud" is the same); (ii) redundancy is eliminated, which reduces the number of axes; (iii) the new axes are ordered so that the first one shows the "largest" and "heaviest" variations (i.e. along this axis frequencies are very different and concern many words and texts), and each following axis brings the "largest" and "heaviest" remaining variations, so that with axes from 1 to any number *N*, one gets the best *N*- dimensional view of the lexical variations and text oppositions inside the corpus. Given the value 2 for *N*, the corpus can then be visualized as a map using the Cartesian coordinate system, knowing that this map is mathematically proven as being the best 2Dvisualization in order to focus on the greatest differences inside the corpus. What is to be read on this map is a quantitative summary of the main correspondences and oppositions among texts. The axes are complex weighted combinations of words whose composition might be studied, but the main use of correspondence analysis for text analysis is to look at the relative positions of texts, and axes are first used to provide the best angle to get the best view.

Figure 22 applies correspondence analysis to Plato's work, so that one gets a view about text similarities or oppositions for high frequency word usage.

Correspondence analysis is conceptually similar to principal component analysis, but correspondence analysis is preferred to principal component analysis here because it better fits the data. In the field of textometry, textual data are represented in frequency tables where rows are words (or other kinds of linguistic units), and columns are texts (or groups or parts of texts dividing the corpus). In this kind of table, rows and columns are both categorical variables (a set of words and a set of texts) and play symmetric roles, so structurally this is a two-way table (also called a cross tabulation, or a contingency table). Correspondence analysis is specifically designed and relevant for the analysis of such contingency tables, for which it proves getting better results than principal component analysis (Lebart, Salem, and Berry 1998:63-69).

5.3 "Back-to-text": Concordances and word-in-context functions as main features

What is called the "back-to-text" functionality in the textometric field is actually the core of textometric processing: every result (lexical list, table, or graph) must be interpreted with an eye toward corresponding words in context.

This could be a distinctive feature of a textometric approach, an efficient way to distinguish it among many current text mining proposals. With a text mining approach, one digs into texts in order to extract pieces of information, so that all the analysis focuses on these few well identified pieces instead of an unstructured full text; and visualization is often the goal, the end of the analysis, with a synthetic and suggestive view that replaces and summarizes the corpus. On the contrary, the textometric approach chooses and implements the hermeneutic circle: any statistical summary or view has to be interpreted looking back to the text, any distant reading view invites renewed close reading, so analysis cannot get rid of textual richness and complexity—it is grounded on this textual source material.

Bibliography

- Benzécri, Jean-Paul, et al. 1973. L'analyse des données. Vol. 1, La taxinomie. Vol. 2, L'Analyse des Correspondances. Paris.
- ———. 1981. Pratique de l'analyse des données. Vol. 3, Linguistique & lexicologie. Paris.
- Brunet, Étienne. 2009. *Écrits choisis*. Vol. 1, *Comptes d'auteurs: Études statistiques de Rabelais à Gracq*. Ed. Damon Mayaffre. Paris.
- ———. 2011. Écrits choisis. Vol. 2, Ce qui compte: Méthodes statistiques. Ed. Céline Poudat. Paris.
- ———. 2016. *Écrits choisis*. Vol. 3, *Tous comptes faits: Questions linguistiques*. Ed. Bénédicte Pincemin. Paris.
- Christ, Oliver. 1994. "A Modular and Flexible Architecture for an Integrated Corpus Query System." In *Papers in Computational Lexicography (Complex '94)*, 22–32. Budapest.

- 36
- Evert, Stefan, and Andrew Hardie. 2011. "Twenty-First Century Corpus Workbench: Updating a Query Architecture for the New Millennium." In *Proceedings of the Corpus Linguistics 2011 Conference*. Birmingham.
- Gries, Stefan Th. 2012. "Corpus Linguistics: Quantitative Methods." In *The Encyclopedia of Applied Linguistics*, ed. C. A. Chapelle, 1380–1385. Oxford.
- ———. 2014. "Quantitative Corpus Approaches to Linguistic Analysis: Seven or Eight Levels of Resolution and the Lessons They Teach Us." In *Developments in English: Expanding Electronic Evidence*, ed. M. Kytö Taavitsainen, Cl. Claridge, and J. Smith, 29–47. Cambridge.
- Heiden, Serge. 2010. "The TXM Platform: Building Open-Source Textual Analysis Software Compatible with the TEI Encoding Scheme." In 24th Pacific Asia Conference on Language, Information and Computation - PACLIC24, ed. R. Otoguro, K. Ishikawa, H. Umemoto, K. Yoshimoto, and Y. Harada, 389–398. Tokyo.
- Heiden, Serge, Matthieu Decorde, and Sébastien Jacquot. 2018. TXM User Manual: Version 0.7 Alpha. Trans. Sara Pullin. Lyon. http://textometrie.enslyon.fr/files/documentation/TXM%20Manual%200.7.pdf.
- Lafon, Pierre. 1984. Dépouillements et statistiques en lexicométrie. Paris.
- Lebart, Ludovic, André Salem, and Lisette Berry. 1998. Exploring Textual Data. Boston.
- Léon, Jacqueline, and Sylvain Loiseau, eds. 2016. *Quantitative Linguistics in France*. Lüdenscheid.
- Marchand, Stéphane, and Pierre Ponchon. 2016. Gorgias *de Platon suivi de* Éloge d'Hélène *de Gorgias*. Paris.
- Marchello-Nizia, Christiane, and Alexei Lavrentiev. 2013. *Queste del saint Graal: Édition numérique interactive du manuscrit de Lyon (Bibliothèque municipale, P.A. 77)*. Lyon. http://catalog.bfm-corpus.org/qgraal_cm.
- McEnery, Tony, and Andrew Hardie. 2012. *Corpus Linguistics: Method, Theory and Practice*. Cambridge, MA.
- O'Sullivan, Neil. 1993. "Plato and ή Καλουμένη Ῥητορική." Mnemosyne 46:87-89.
- Salem, André. 1987. Pratique des segments répétés: essai de statistique textuelle. Paris.
- Schiappa, Edward. 1990. "*Did Plato Coin Rhètorikè*." *The American Journal of Philology* 111:457–470. https://doi.org/10.2307/295241.
- ———. 1999. The Beginnings of Rhetorical Theory in Classical Greece. New Haven and London.