Reconciling the Dynamics of Language with a Grammar Handbook. The ongoing Pedalion grammar project

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Benefitting from recent developments and insights in the fields of technology, linguistics, and language didactics alike, the Greek grammar *Pedalion* (<http://www.pedalion.org/> – Ancient Greek πηδάλιον means ‘rudder’) seeks to offer a *contemporary* instrument that is tailored to mastering and understanding *ancient* languages.

1. Background: the limits of conventional grammars in language teaching

For centuries, grammars have been indispensable tools for learning foreign languages. Whereas in recent decades emphasis in living language learning has been on communication-based rather than on grammar-oriented methods, grammars are still of prime importance in teaching and learning languages that are no longer spoken. This can be explained by the fact that the study of classical languages mainly focuses on learning how to decode and interpret texts: the active language skills complementing receptive skills in the study of modern languages are largely absent.² Furthermore, grammar cannot only help language learners in acquiring a firm command of a foreign language, it is also seminal in enhancing the learners’ understanding of general linguistics and language structures.

The online *Pedalion* grammar, being both a reading aid and a general reference work, aims to overcome some limits that are inherent to static grammars. First, printed grammars are always destined to a specific readership. Grammars tailored to the needs of high school students will turn out to be unsatisfactory for university students and researchers. On the other hand, a more extensive grammar—perfectly suited for researchers—would probably be too overwhelming for beginning students. Second, a printed grammar is, by its own nature, based on a single and static taxonomy. We argue that this lack of dynamicity does not do enough justice to the nature of language.

Following the general principles of Functional Linguistics, one could consider every language as a complex system consisting of formal features (e.g. cases, prepositional phrases, word order, verbal moods, etc.), expressing a wide range of semantic notions (e.g. ‘cause’, ‘future’, ‘exclamation’) and fulfilling diverse functions, both syntactic (a basic distinction in this regard is the division between omissible and non-omissible constituents) and pragmatic (e.g. topic vs. focus, illocutionary forces etc.).³ In most languages, the interplay between formal, semantic, syntactic, and pragmatic features tends to be highly complex. This means that the interaction between these factors can normally only be conveyed as a many-to-many

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² Nevertheless, learning methods are available that do make use of immersion-based principles. For Latin, one can cite Ørberg (1981¹), and for Ancient Greek, Saffire and Freis (1999³) and Rico (2009). Handbooks such as the Italian version of *Athenaze* (Balme et al., 2009) still make abundant use of the learner’s language.

³ The functional approach to linguistics, as outlined in reference works such as Dik (1997), has been successfully applied to Greek syntax by various authors, e.g. Emilio Crespo and Albert Rijksbaron (see also De la Villa, 2013).

relationship. This is definitely the case for Ancient Greek. So, for instance, Ancient Greek renders the *semantic* role CAUSE/REASON with a wide range of *formal* means (e.g. by making use of cases, prepositional phrases, participles and adverbial subordinate clauses). Conversely, the two cases marking CAUSE/REASON in Greek, viz. Dative and Genitive, are also used to denote several other semantic roles (among many other notions, INSTRUMENT, PLACE etc.).

Traditional grammars have great difficulties in capturing and conveying this complex interplay between form [FORM, including both phonology and morphology], content [CONT, including semantics and content-oriented pragmatics], and hierarchy [HIER, including syntax and language levels beyond the individual predication, that are generally treated in pragmatics]. Even when they are accessible online, the large majority of existing grammars are of a static nature, which means that their hierarchical structure is strictly fixed.⁴ This is to say that a grammar maker is bound to define a static taxonomy of form, content, and hierarchy features. When composing a grammar of Ancient Greek, one can choose at least one of the following trajectories (see Table 1):

Greek grammar A	Greek grammar B	Greek grammar C
...	...	...
Genitive [FORM]	Cause/Reason [CONT]	Omissible constituents [HIER]
1. Omissible constituents [HIER]	1. Genitive [FORM]	1. Cause/Reason [CONT]
1.1. Cause/Reason [CONT]	1.1. Omissible constituents [HIER]	1.1. Genitive [FORM]
1.2. Time span		
1.3.		

Table 1 Hierarchies in static grammars

Each of these hierarchical approaches has its assets and its weaknesses. Grammar A—the scheme followed by most grammars of ancient languages—is best suited as a reading grammar: when encountering a genitive in a text, the reader can swiftly find a list of its possible meanings. Grammars B and C, on the other hand, will be more helpful in other respects, e.g. as a guide for prose composition, for attaining a deeper understanding of language structures, etc. In other words, the usefulness of a grammar is highly dependent on the individual needs and aims of a language learner (reading and interpreting, learning to speak or write, etc.), since it is not possible to modify a grammar's hierarchical principles. Likewise, every static grammar requires that the user has a basic acquaintance with its internal structure, in order to be consulted.

2. Description of the project

2.1. Aims and advantages

In order to overcome the static character of traditional grammar and the problems it entails, the *Pedalion* project aims at redesigning Ancient Greek grammar.⁵ It will grant users a dynamic and efficient access to those parts of the grammar that suit their needs in terms of a formal, semantic, or syntactic perspective.

⁴ See, for instance, *the Internet Grammar of English* (<http://www.ucl.ac.uk/internet-grammar/>), which allows users to look for keywords, albeit in a static hierarchy. The *grammis 2.0* project (<http://hypermedia.ids-mannheim.de/>) of the *Institut für deutsche Sprache* is innovative in its use of hyperlinks. However, its *Systematische Grammatik* retains a fixed hierarchy, as if it were a printed book. Πηδάλιον can partly elaborate on the results of the KU Leuven *Alfagram* project, which is a web-based grammar and assessment application (<http://wwwling.arts.kuleuven.be/alfagram/>; see Desmet *et al.* 2001 for a description).

⁵ *Pedalion* is the result of a two-year research project (acronym dyLEGram, project number 3H130302) granted by the educational council of Leuven University (duration: 01.10.2013-30.09.2015). The project, whose prime supervisor is Toon Van Hal, is carried out by Yannick Anné. Hans Coppens is responsible for implementing the grammar in a Drupal environment.

Precisely the grammar's dynamic character will stimulate the students to deal with Ancient Greek in a more flexible way. When making use of *Pedalion*, students will be trained

- (a) to switch from the language's formal level to its semantic, syntactic, or pragmatic level and vice versa;
- (b) to study the language from both a synchronic and a diachronic perspective;
- (c) to appreciate the language-specific features of Greek in that the grammar also incorporates insights from general and typological linguistics.

The development of an online dynamic reading and learning grammar will allow our students to follow a learning path tailored to their individual levels and needs. Both the grammar's flexible taxonomical possibilities and the incorporation of the most recent linguistic and didactic insights will foster considerably the students' linguistic competences as they will acquire a more profound knowledge of the Ancient Greek language as well as of the Ancient Greek texts.

Relying on recent monographs, authoritative reference works and specialist articles in the fields of synchronic, diachronic, and typological linguistics in general and Ancient Greek linguistics in particular,⁶ the grammar will encompass recent insights into linguistics, thus guaranteeing its continued usefulness to students interested in conducting research in the growing field of historical linguistics. In addition, its authors are making intensive use of several linguistic corpora, including *Alpheios*, *Perseus under PhiloLogic*, *Logeion*, *TLG* and *Iliados*, thus allowing us to find new example sentences and to gauge the frequency of specific constructions, forms or collocations.

⁶ The most important general reference grammars include Crespo *et al.* (2003) and Bornemann & Risch (1978). As to the specialized books, one could mention Duhoux (2000) and Rijksbaron (1994) for the verbal system, and Luraghi (2003) and Bortone (2010) for the syntax of prepositions and cases. Despite being outdated from a linguistic point of view, traditional school grammars such as Smyth (first edition 1916) and Goodwin (1890) remain invaluable sources of author-specific remarks and examples. The new three-volume *Encyclopedia of Ancient Greek Language and Linguistics* (Giannakis 2014), which encompasses a wide array of articles discussing Greek linguistics from divergent perspectives and approaches, is a recent goldmine of information.

2.2. Micro-structure: The structure of a paragraph

The grammar's flexibility resides in the specific design of its elementary brick-stones ('paragraphs'). This is, in a simplified way, how a prototypical paragraph looks like (Figure 1):

Figure 1 Design of a paragraph in Pedalion

- The SUCCINCT EXAMPLE serves as a first introduction to (and illustration of) the grammatical rule to be dealt with. Being as short as possible, it can also be regarded as a mnemonic operator.
- The grammatical RULE, phrased in a systematic and formulary way, offers formal, semantic, and syntactic information.
- Partly determined by corpus-based parameters, the LEVEL TAG specifies the rank and significance of the rule (fundamental: ①, basic: ②, advanced: ③, specialized: ④).
- In sharp contrast to most extant grammars of Ancient Greek, Pedalion seeks to adopt a high rate of original EXAMPLE SENTENCES extracted from classical works (with special attention for authors being central in the Leuven curriculum of Ancient Greek studies). A link to the Perseus Library ensures that the users can study these sentences in their original textual context.
- The SUPPLEMENTARY INFORMATION offers more details on lexical patterns and syntactical behaviour related to the rule, as well as on its frequency and its historical background.
- The clickable GRAMMATICAL TAGS, divided into three categories (FORM, CONTENT, and HIERARCHY – see 2.1) provide the users with some general and cross-linguistic background. More importantly, these tags also lie at the basis of the grammar's ultimately flexible backbone. A more complex rule states that 'οὐ μή + indicative future denotes a strong negation'. For this rule, the grammatical tags are the following (Table 2):

Form tags	Content tags	Hierarchy tags
<ul style="list-style-type: none"> tense <ul style="list-style-type: none"> future mood <ul style="list-style-type: none"> indicative particle <ul style="list-style-type: none"> οὐ μή 	<ul style="list-style-type: none"> modality <ul style="list-style-type: none"> deontic modality clause type <ul style="list-style-type: none"> negation 	<ul style="list-style-type: none"> syntactic level <ul style="list-style-type: none"> main clause

Table 2 Grammatical tags of a given paragraph

2.3. Macro-structure: steering through the paragraphs

Both the grammatical and the level tags have been implemented in a faceted search-environment, which allows the users to select multiple parameters in order to narrow down the full list of rules. In doing so, they

can find in an efficient manner the data they desire. So, for instance, a student reading a Greek text will be able to select ‘Dative’ (formal tag) and ‘Satellite’ (syntactic tag) so as to generate a survey of the many semantic roles the dative case can denote (e.g. Manner, Instrument, Cause, etc.). By selecting the tag ‘Purpose’, on the other hand, a student making a translation from Dutch into Ancient Greek, will discover the range of formal means with which this semantic notion is expressed: cases, prepositions, subordinate clauses, infinitives and participles, etc.

Figure 1 *Pedalion's* four types of filters: study level (*studieniveau*), syntactical level (*syntactisch niveau*), form (*vorm*), and content (*inhoud*).

Hence, one and the same set of paragraphs will serve as brick-stones to build ‘different’ grammars. As a consequence, *Pedalion* will serve not only as a reference grammar, but also as a reading grammar and as a learning grammar. Table 2 gives an illustrative overview of the content tags related to verbal categories.

<ul style="list-style-type: none"> • aspect <ul style="list-style-type: none"> ○ lexical aspect ○ grammatical aspect <ul style="list-style-type: none"> ▪ infective aspect ▪ confective aspect ▪ perfect aspect • modality <ul style="list-style-type: none"> ○ deontic modality <ul style="list-style-type: none"> ▪ adhortation ▪ unattainable wish ▪ deliberation ▪ obligation ▪ attainable wish ○ epistemic modality <ul style="list-style-type: none"> ▪ potentiality ▪ neutral modality ▪ contrafactuality ▪ expectation • time (external temporality) <ul style="list-style-type: none"> ○ absolute temporality <ul style="list-style-type: none"> ▪ past time ▪ present time ▪ future time ▪ timelessness ○ relative temporality <ul style="list-style-type: none"> ▪ anteriority ▪ simultaneity

<div> <div></div> <div>posteriority</div> </div>
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Table 3: Overview of content tags related to verbal categories.

2.4. Technological details

The *Pedalion* grammar has been designed in a relational *Filemaker* database, all tables of which can be easily exported to other formats such as csv, thus ensuring its future sustainability.⁷ Importantly, the database structure is based on *persistent stable identifiers*, i.e. unique numbers assigned to each grammatical rule. These identifiers are not linked to any specific hierarchy, as are the paragraph numbers in a traditional grammar book. This allows for stable URLs, even when changing insights would change a rule’s title or classification. Furthermore, the stable identifiers allow for links between different applications (i.e. between the grammar’s examples and their source texts or between an exercise module and the relevant passage in the grammar) or between different language versions of the same grammar.⁸

The online application will run under *Drupal*, whose chief advantages for our purposes are its open-source character and its adaptability. The core functionality of this content manager is accompanied by an extensive range of modules being continuously developed and maintained by an active user community. The entire application will be freely accessible under a **Creative Commons** license. Essentially, a custom-made faceted search module has been added to the basic Drupal system, ensuring ease of access for all users.

3. Implementation in classroom learning

Following the principles of *blended* or *hybrid learning*, *Pedalion* will be both a guide for classroom study and an online tool enabling students to explore the grammatical system of Ancient Greek at their own pace. During classes, a printed version—necessarily involving a static hierarchy—will be used for teaching, although the electronic version will be frequently used for the sake of clarification, illustration, and comparison. Students will be stimulated to go beyond the printed grammar and explore the dynamics of grammar by using the online tool in their individual reading. Thanks to an adaptive interface, users will be able to consult *Pedalion* on any device, be it a personal computer, tablet, or smartphone. After encountering a GOAL expression in a Greek text under study, a teacher could, for instance, ask the students to come up with alternative constructions the Greek author could have used. The *Pedalion* grammar thus allows the students to explore Greek grammar in a creative and efficient way.

In addition, the project also encompasses an integrated exercise and assessment package, running under the *Edumatic* software. This software package is integrated in the *Blackboard* learning environment and actively used within the University of Leuven for learning modern languages. As such, it allows for the creation of various types of exercises (e.g. multiple choice, drop-down, fill in the gap, etc.). The feedback field will contain a link to the relevant *Pedalion* paragraph. Recent studies have confirmed the importance of instant feedback, which has been proven to contribute considerably to students’ learning progress

⁷ Tables have been created for the syntactic paragraphs, the examples (to be used both for the grammar and the exercises), the grammatical tags, and a number of other content types (e.g. morphological and phonological rules). All of these tables are interlinked in multiple ways.

⁸ The importance of both advantages of persistent identifiers – i.e. their stability and their connectivity – has been highlighted in many other recent and ongoing projects, such as the Trismegistos Interdisciplinary Platform for Ancient World Texts and Related Information (see Depauw and Gheldof 2014).

(López-Pastor 2013, with further references). During classes, there will be time to deal more extensively with questions and problems that have emerged when making the digital exercises at home.

4. Future perspectives

With the support of additional funding, the structures developed for *Pedalion* could be easily adapted for making a similar grammar for Latin. Greek has been prioritized, since no complete, up-to-date grammar of Ancient Greek exists in the Dutch language.⁹ Looking beyond the Dutch-speaking world, we are considering the possibility of making an English or French translation of the grammar, which in a best-case scenario could be interlinked with ongoing initiatives in the field of Digital Classical Humanities such as Perseus. The use of persistent stable identifiers in general opens many other perspectives. It will allow us to connect the contents of other e-learning applications (e.g. exercise modules) with the relevant rules in the grammar. We will also investigate to what extent the grammatical rules can be utilized in the framework of ongoing treebank projects of Ancient Greek texts.¹⁰

5. References

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⁹ Apart from school grammars with their necessary limitations, no complete grammars are available. Rijksbaron (2000) is a collection of *capita selecta* rather than a full-blown syntax. Van de Vorst (1954), despite being basically a school grammar from the 1930s, is so far the only useful alternative. For a complete grammar of Latin in the framework of Functional Linguistics, one could refer to Pinkster (1984).

¹⁰ We are currently in touch with Giuseppe Celano (University of Leipzig), one of the driving forces of the *Arethusa* treebanking application (www.perseids.org/tools/arethusa/app/). In the near future, advanced students of the University of Leuven will be invited to treebank examples sentences of the new grammar by making use of the *Arethusa* system.

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