

# Documentation for the greektonoi.sty package and greektonoi.map mapping.

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2015/12/12

## Abstract

The greektonoi package provides the possibility to directly type or paste in ancient Greek texts with diacritical characters and transforming monotonic texts to polytonic ones. To insert accents and breathings we use a method similar to the common Beta Code convention.

This file documents version 0.1 of greektonoi.sty.

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## 1 Introduction

From 1952 the polytonic(multi-accents) writing system in Greece was abolished by the Greek parliament. However the need of using it has not been eliminated. Many publishing houses, the Orthodox Church of Greece, writers, scholars and other individuals continue to write with the polytonic system. The [www.unicode.org](http://www.unicode.org) included, luckily, almost all the monotonic and polytonic Greek characters: Unicode Greek and

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Coptic code set (with codes U + 0370 - U+03FF), Greek Extended code set (from U + 1F00 - U+1FFF) and Combining Diacritical Marks code set (U + 0300 - U+036F) as well. The Greek dithogous (διφθογός) ‘ou’ is one of the few exceptions letters that are not included (see [https://en.wikipedia.org/wiki/0u\\_\(ligature\)](https://en.wikipedia.org/wiki/0u_(ligature)) ). Generally, writing in the polytonic system (in electronic devices) remains a difficult problem. The problem has been successfully confronted with  $\TeX$  and its branches. We make a package `greektonoi.sty` and a map file `greetonoi.map` that gives us the opportunity to include polytonic letters in our texts using  $\XeTeX$  engine. We can also use them for the easy (but not automatic) conversion of monotonic texts into polytonic ones.

## 2 Design Details

Writing polytonic texts in  $\TeX$  is usually done using the Greek option of `babel` package. So with the instruction:

```
\usepackage[polutonikogreek]{babel}
```

in the preamble of our file, we can start writing immediately a polytonic text. The insertion of accents and breathings is an easy task without using any special combinations of keys and dead keys from the keyboard. The encodings are: to insert the greek accent(tonos) we simply use the symbol ‘ (U+0027), we put the diaeresis using the symbol " (U+0022). For the acute accent we use the same character as for the greek accent, we insert the vareia(grave) with the symbol ` (U+ 0060) and the circumflex (perispomeni) with the symbol ~ (U+007E). The encodings for the breathings are: we use the symbol > (U+003E) for the psili(smooth, lenis), we use the symbol < (U+003C) for the daseia (asper, dense) and for the iota subscriptum (υπογεγραμμένη) we use the symbol | (U+007C). In order to write, for example, the word ἀμαρτία we insert simply <amart’ia (see <http://tex.stackexchange.com/questions/210843/how-do-i-write-amartia-in-polytonic-greek> ).

Another possibility is to use of the `betababel` package (see <http://ftp.yzu.edu.tw/CTAN/macros/latex/contrib/betababel/betatest.pdf>). This uses the same concepts with the exception that the encodings are different from the ones before. So we insert the psili with ), the daseia with (, the diaeresis with +, the acute accent with /, the vareia (grave accent) with \, the circumflex accent with the symbol = and the iota subscriptum with the symbol |.

The main problem with the above methodologies is that the output is *not* Unicode and it can not be re-used. Also, they don’t have enough flexibility: For example, the `*/)ANDRA` will give the correct result with the `betababel` package but the `*/)ANDRA` will not. Another problem that we found out is that most of the above combinations are inserted using the Shift key which we think is time consuming and makes typing more difficult for one hand typing.

## 3 The mapping file `greektonoi.map`

The  $\XeTeX$  engine gives us fantastic possibilities for the easy use of Unicode fonts of ttf and otf font format without installing them in our computer. The above men-

tioned packages, babel and betabel, cannot be used, unfortunately, with X<sub>Y</sub>TeX engine. Because of that, we decided to design from the beginning a proper mapping file to work with the option `\setmainlanguage[variant=polytonic]{greek}` of the polyglossia package. In `greektonoi.map` there are almost 3,000 accents combinations in order to easily insert the polytonic symbols. The new encodings are : ``` (U+0027) and `'` (U+0060) for bareia, `-` (U+002D) and `|` (U+007C) for the iota subscriptum, the `)` (U+0029) and `]` (U+005D) for the acute accent, the `((` (U+0028) and `[(` (U+005B) for the grave accent and the `"` (U+0022) or `+` (U+002B) for the diaeresis. We can put the usual tonos accent with the normal way using the Greek keyboard (using, for example, a combination of ; with a vowel in PCs) or with the symbol `/` (U+002F). The symbols `|`, `(`, `)`, `+`, `/`, `=` and ``` correspond to the symbols `|`, `(`, `)`, `+`, `/`, `=` και ``` that we see in the betabel package.

The use of the Shift key in most of the above cases could be eliminated with the use of the symbols: `-`, `[`, `]`, `"`, `/`, `=` respectively that doesn't use the Shift key in order to be insert them (except for the `"` (U+0022)). The last symbol `"` usually does not imported correctly in the text with some editors such as Word, for example (MS Word wrongly imports the character `«` (U+00AB)). In this case, we could alternately use the symbol `+`. We could insert these auxiliary symbols in our text in any possible order. The only mnemonic rule we have set is: all of the diacritical characters are placed to the left of the vowel in any order. The iota subscriptum (`|` or `-`) should definitely come just before or just after the vowel. To take, for example, the word ἀμαρτία, we write `[αμαρτία-` or `(αμαρτία|` or `[αμαρτ/ια|` or `(αμαρτ/ι-α`). The first two combinations `[αμαρτία-` or `(αμαρτία|`, are very useful in case we have already the (monotonic) word ἀμαρτία (or a whole monotonic text that we like to convert to polytonic one using `greektonoi.map`). We simply add the proper symbols at the left of the vowels that we interested in and we get the polytonic text in the output.

**Example:** In order to have the polytonic text

Τη πάντα διδούση καὶ ἀπολαμβάνουση φύσει ὁ πεπαιδευμένος καὶ αἰδήμων  
λέγει· «δὸς, ὃ θέλεις, ἀπόλαβε, ὃ θέλεις». Λέγει δὲ τοῦτο οὐ καταθρασυνόμενος,  
ἀλλὰ πειθαρχῶν μόνον καὶ εὐνοῶν αὐτῇ.

from the corresponding monotonic we could type:

Τη- πάντα διδούση| κα`ι ]απολαμβάνουση| φύσει [ο πεπαιδευμένος κα`ί  
α]ιδήμων λέγει· «δ`ος, `(ο θέλεις, ]απόλαβε, [ `ο θέλεις». Λέγει δ`ε το=υτο  
ο)υ καταθρασυνόμενος, ]αλλ`ά πειθαρχ=ών μόνον κα`ι ε]υνο=ων α]υτ=|η.

We noticed a problem with the use of the symbols `]` and `[` after the use of the double backslash `\\`. For example, the `\\[ `v =]v` arise a problem but the `\\( `v =]v` or `\\{ [ `v =]v` does not. The use of the double `{` and `}` is a simple solution in order to separate the `\\` from the subsequent words. We will give below a complete example of `greektonoi` encoding using X<sub>Y</sub>TeX engine.

```
\documentclass[a4paper]{article}
\usepackage{fontspec}
```

```

\setmainfont{Arial}
\usepackage{polyglossia}
\setmainlanguage[variant=polytonic]{greek}
\newfontfamily\greekfont{GFS Neohellenic}
\newfontfamily\baske[Mapping=greektonoi]{GFS Baskerville}
\begin{document}
{\baske Τη- πάντα διδούση| κα'ι ]απολαμβανούση| φύσει [ο πεπαιδευμένος
κα'ι α]ιδήμων λέγει· «δ'ος, `[ο θέλεις, ]απόλαβε, `[ο θέλεις». Λέγει δ'ε
το=υτο ο]υ καταθρασυνόμενος, ]αλλ'α πειθαρχ=ών μόνον κα'ι ε]υνο=ων α]υτ=η-.
}\par
{\greekfont \addfontfeature{Mapping=greektonoi} Τη- πάντα διδούση| κα'ι
]απολαμβανούση| φύσει (ο πεπαιδευμένος κα'ί α)ιδήμων λέγει·
«δ'ος, [ο θέλεις, ]απόλαβε, [ο θέλεις». Λέγει δ'ε το=υτο ο]υ
καταθρασυνόμενος, ]αλλ'ά
πειθαρχ=ών μόνον κα'ι ε]υνο=ων α]υτ=η-.}
\end{document}

```

The output is

*Τη πάντα διδύση καὶ ἀπολαμβάνουσα φύσει ὁ πεπαιδευμένος καὶ αἰδήμων λέγει· «δός, ὁ θέλεις, ἀπόλαβε, ὁ θέλεις». Λέγει δὲ τὸ τοῦτο ὁ καταθρασυνόμενος, ἀλλὰ πειθαρχῶν μόνον καὶ εὐνοῶν αὐτῇ.*

*Τη πάντα διδούση καὶ ἀπολαμβάνουσα φύσει ὁ πεπαιδευμένος καὶ αἰδήμων λέγει· «δός, ὁ θέλεις, ἀπόλαβε, ὁ θέλεις». Λέγει δὲ τοῦτο οὐ καταθρασυνόμενος, ἀλλὰ πειθαρχῶν μόνον καὶ εὐνοῶν αὐτῇ.*

In the above example we used two new font families, the GFS Neohellenic and GFS Baskerville from the Greek Font Society (see [http://www.greekfontsociety.gr/pages/en\\_typefaces.html](http://www.greekfontsociety.gr/pages/en_typefaces.html)). For the first typeface we used greektonoi mapping only locally ie. only for the part of our text that is included inside the

```
{\greekfont \addfontfeature{Mapping=greektonoi} ...},
```

We used the greektonoi.map mapping and the second typeface named \baske for a whole text area (that uses the \baske typeface). In order to take the pdf output from the above code we have to install the greektonoi mapping or alternatively, put the file greektonoi.tec in the same folder that we have saved the above code(with the .tex extention).

## 4 The greektonoi package

The greektonoi.map mapping is useful only in large polytonic texts written without math symbols or other  $\TeX$  commands in the middle. The use of [ and ] for inserting breathings is completely improper in texts that include  $\TeX$  commands because these characters are used to delimit the set of variables from the body of the command. Therefore, we made greektonoi.sty package which is more suitable for such

cases. There are almost nine hundreds commands stored in the package for easy importing of greek numerals, polytonic archaic Greek, accents, breathings and other symbols. The commands have been using letters from the Greek alphabet (β, ψ, δ, π and so on) although in a future revised version we intent to extend the package with commands that use only ascii characters for those users that do not have the greek keyboard. In greektonoi.sty underlie the same concepts as in greektonoi.map. The vareia(βαρεία) is inserted using the letter β, for psili(ψιλή) we use ψ, daseia(δασεία) is inserted with δ and the circumflex(περισπωμένη) is inserted typing π. For iota subscriptum (υπογεγραμμένη) we use the letter μ, for tonos the letter τ and for diaeresis(διαλυτικά) the λ character. So to write the text above using exclusively the greektonoi.sty package we could type the following:

```
\documentclass[a4paper]{article}
\usepackage{fontspec}
\setmainfont{Arial}
\usepackage{polyglossia}
\setmainlanguage[variant=polytonic]{greek}
\newfontfamily\baske{GFS Baskerville}
\usepackage{greektonoi}
\begin{document}
{\baske Τμη πάντα διδούσμη κα\βι \ψα{}πολαμβανούσμη φύσει \δο πεπαιδευμένος
κα\βί α\ψι{}δήμων λέγει\; \<<δ\βορ, \δβο θέλεις, \ψα{}πόλαβε, \βδο θέλεις\>>.
λέγει δ\βε το\πυ{}το ο\ψυ καταθρασυνόμενος, \ψα{}λλ\βά πειθαρχ\πών μόνον κα\βι
ε\ψυ{}νο\πων α\ψυ{}τ\πη.
}
\end{document}
```

It should be noted that the use of the double {} is necessary to separate a command from the rest of the word. For example: \ψαπολαμβανούσμη is not correct because there is no command named \ψαπολαμβανούσ The {} combination separates the initial ά (written with the command \ψα) of the word άπολαμβανούση from πολαμβανούση (which uses the command \ημ or equivalently the \μη to put the iota subscriptum below η). It should be also noted that if a space or other final character (comma, semicolon, colon, quotation mark and so on) follows then the use of {} is not necessary. We can alternatively use the commands \ or \] to avoid the use of Shift key to type the {}. You could also use the tilde character ~ (U + 007E) for this case. Certainly, the latter use the Shift key so the time required for the typing \] (two characters), for example, is the same as the time required for the combination Shift + tilde. If you prefer the tilde symbol for seperation purposes then you should put somewhere in the begining of main part of the code the command \tildeON. The command \tildeOFF restores the ~ (tilde) to its normal L<sup>A</sup>T<sub>E</sub>X use.

**Example:** \ψα\]πόλαβε or equivalently \tildeON .... \ψα~πόλαβε ....\tildeOFF

## 5 Last Comments

The greektonoi.sty package must be in the same folder that we save our code or it must be installed in our  $\text{\TeX}$  system. It can be used with the greektonoi.tec or independently from it. It offers great possibilities for easily typing polytonic greek or converting monotonic to polytonic using simple commands. Within the package are stored with memorable names many commands to type even archaic Greek letters. For example, to insert the left double quotes (U + 00AB, «) we can use the command `\<<` while the corresponding right (U + 00BB, ») are inserted with the command `\>>`. To obtain the semicolon (U + 0387, Greek ano teleia) we use the command `\;`. There is also the possibility to introduce numerals of the Greek system such as sampi Ϡ and ϡ (ie. the greek small letter sampi and letter sampi respectively) with the commands `\σ\μ` and `\Σ\μ` respectively. There are quite a few archaic symbols like digamma Ϝ (U + 03DC, Digamma) and ϝ (U + 03DD, small digamma) using the commands `\Γγ` and `\γγ` respectively and many other commands for the unicode sets mentioned in the introduction. We can find them by an inspection of greektonoi.sty.

## 6 Acknowledgements

I would like to thank the associate professor Antonis Tsolomitis of the Department of Mathematics of the University of Aegean for pointing me out an error in the first version of greektonoi.map and also miss Margaret Christoforatu student of the Department of Mathematics in the University of Aegean who helped me to translate this documentation in English.