Programming languages

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# Greek etymologies
### "If you recognize the parts, you'll understand the whole"

**Context of the problem**

The Spanish is one of the most spoken languages in the world. If we only consider the number of native speakers, Spanish is the second language most spoken in the world with approximately 400 million of speakers.
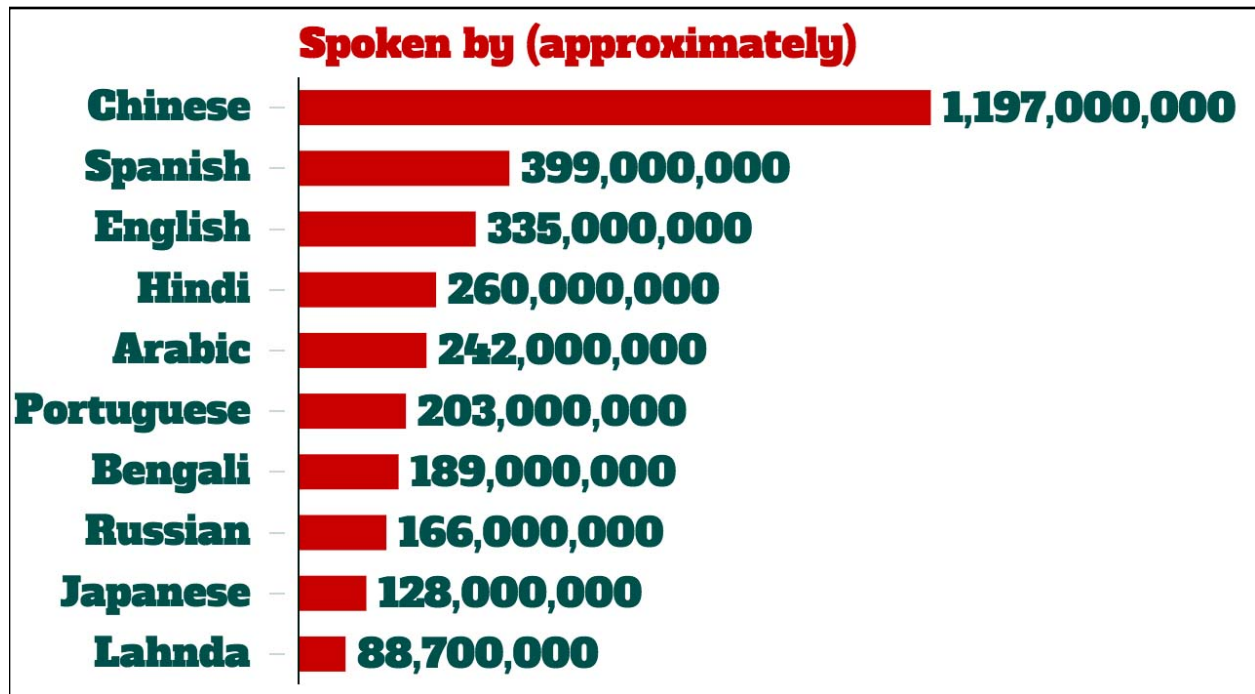


Image 1.1 List of top 10 most spoken languages in the world

Most of people who tries to learn Spanish, claim that this language is very difficult to learn because it contains a lot of different words to learn. The RAE dictionary (Real Academia de la lengua Española) says that the Spanish is composed by more than 93.000 words.

I listened this same problem when I talked with two students from UK and USA respectively, who told me that they really needed to speak and understand the Spanish fluently for their jobs, but they did not have a lot of time to learn it.

There are many people like them, that do not have a lot of time to memorize most of Spanish words, but they need to learn it as fast as possible for different reasons.

**Solution**

Since, I listened this problem for foreign students, I started to think which would the best option to learn a language of this characteristics.

I remembered my high school, one of the classes I took was "latin and greek etymologies" where I understood that the meaning of a word depend on its roots, prefixes and suffixes <u>most of the time.</u>

The etymology is a science that studies the meaning of the words through the knowledge of their origin, structure and transformations over time. Therefore, you can use it to learn the origin of our language, understand the meaning of the words, extend your personal vocabulary, decipher the meaning of unknown words, identify links between some words, understand and better orthography and learn faster a language.
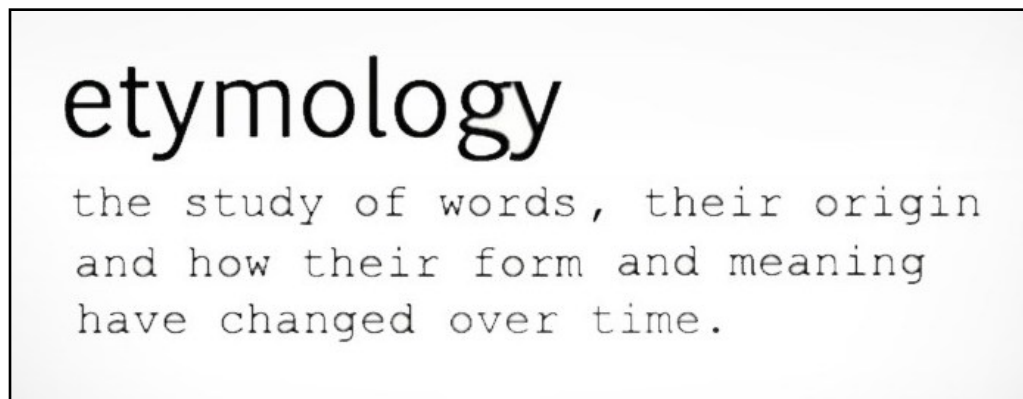


Image 2.1 Meaning of the word "etymology"

Latin and greek roots are used by languages like Italian, French, Spanish and English which are some of the most popular languages in the world, that's why the importance of them. You can use them to learn these languages easier and faster.

My solution is an Scheme program that contains a dictionary with 213 greek roots, 23 prefixes and 19 suffixes to improve the learning or understanding of Spanish language, either you can see the entire dictionary or search possible meanings for an specific word.

**Results**

The Scheme program shows the roots, prefix and suffix for the word searched, it's important that you know that this is a greek dictionary, therefore, if you look for a word that contains a latin root, prefix or suffix, it will not appear complete.

One example could be the word "psicología" which returns:

```
> (meaning "psicología")
Possible meanings for a word

Roots
psico
Meaning(s) = Alma. Espíritu. Aliento vital.
Greek root = ψυχή
Spanish patron(s) = psico. psicó. sico. psiqui.

logos
Meaning(s) = Palabra. Tratado. Estudio.
Greek root = λόγος
Spanish patron(s) = logía. logismo.

Suffixes
-ía
Meaning(s) = Acción. Cualidad.
Greek root = -ια, –εια
Spanish patron(s) = ía.
```

As you can see, the program returns a two possible roots and one possible prefix, so you can infer the meaning for this word, which would be "Estudio del alma" in Spanish.

Test cases: https://github.com/JuanGro/Project-Greek-Etymological-Dictionary/tree/master/Test%20cases

**Architecture**

To create this program, I had to implement 20 different functions, some of them are:

- Function to print the entire dictionary
- Function to to get the meaning for the word
- Function to remove key contained in other key (e.g. "α" in "αν")
- Function to know if the word selected contains one of the Spanish patrons for each root
- Function to know if the word selected contains one of the Spanish patrons for each prefix
- Function to know if the word selected contains one of the Spanish patrons for each suffix
- Function to print the three dictionaries in nice format
- Function that prints the information for each key of the dictionary
- Function to know if the key should be searched as prefix, suffix or root
- Function to remove the keys that do not fit with the word
- Function to fill all the dictionaries

In my opinion, the *functional programming* has:

### Pros

- Brevity: The code could be very concise
- You can avoid mistakes with this paradigm because you can separate everything in functions only using its inputs, so you avoid errors.

### Cons

- At the beginning, it is hard to handle if you have used a lot other paradigms
- Some functions could be hard to implement comparing with other paradigms

To see my code, go to: https://github.com/JuanGro/Project-Greek-Etymological-Dictionary/blob/master/Code/Project.rkt, all the code is commented and explained.

**Conclusions**

I have developed a program that could be useful for the people who is trying to learn a lot of vocabulary in the Spanish language, for native speakers that want to improve their knowledge and orthography, understand faster not common or popular words and obviously for people who wants to learn Greek.

```
> (complete-dictionary)
Roots
hetero-
Meaning(s) = El otro. Distinto.
Greek root = ετερος
Spanish patron(s) = hetero.

-mancia
Meaning(s) = Adivinación.
Greek root = -μαντεία
Spanish patron(s) = mancia.

dactilo-
Meaning(s) = Dedos.
Greek root = δακτυλος
Spanish patron(s) = dactilo.

tono
Meaning(s) = Tono.
Greek root = τόνος
Spanish patron(s) = tono.

tánatos
Meaning(s) = Muerte. Homicidio.
Greek root = θάνατος
Spanish patron(s) = tanato. tanasia. tanasio.

geo
Meaning(s) = Tierra.
Greek root = γεως
Spanish patron(s) = geo.

giné
Meaning(s) = Mujer.
Greek root = γυνή
Spanish patron(s) = gine. gino. ginia.
```

Image 3.1 Part of the entire greek dictionary

**Setup instructions**

Start DrRacket IDE (If you do not have it, download it here: https://download.racket-lang.org)

Run the program "Project.rkt"

To see all the dictionary roots, prefixes and suffixes, type:

> *(complete-dictionary)*

To search the possible meanings for a word, type:

*(meaning word)*

One example could be:

*(meaning "psicología")*

To see the number of entries in root, prefix or suffix dictionary, first type:

*(fill_root_dictionary roots)* or

*(fill_prefix_dictionary prefixes)* or

*(fill_suffix_dictionary suffixes)*

Then:

*(dict-count roots)* or

*(dict-count prefixes)* or

*(dict-count suffixes)*

**References**

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