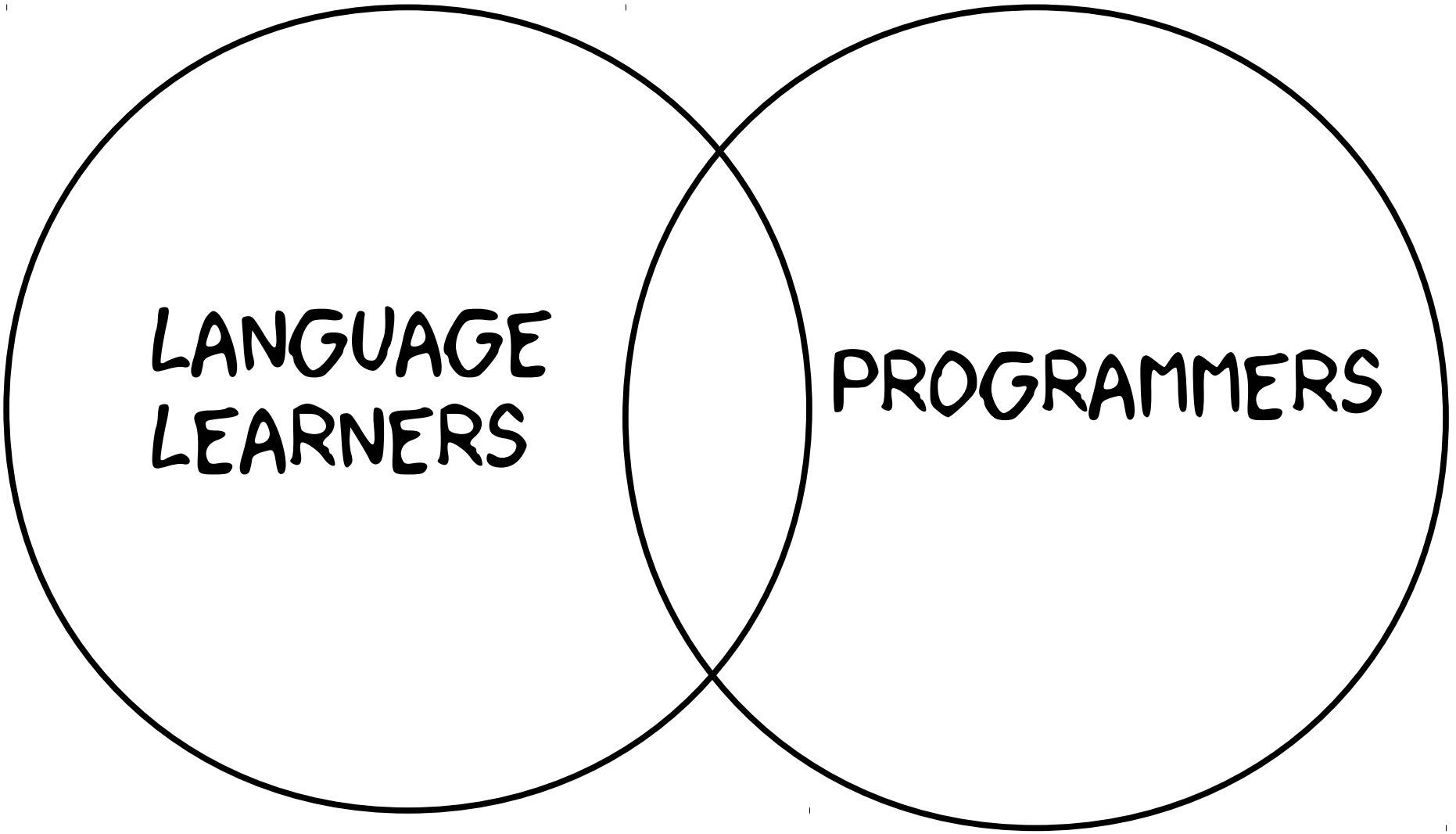
Better (natural) language learning through Python

Michelle Fullwood
@michelleful

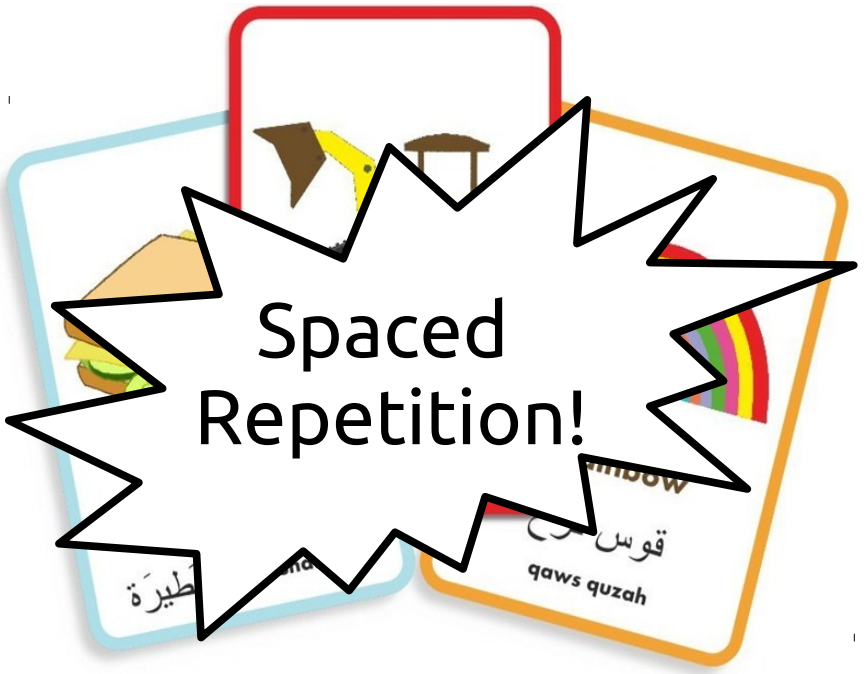


PSA: LINGUIST != POLYGLOT

Source: sinoconcept.com

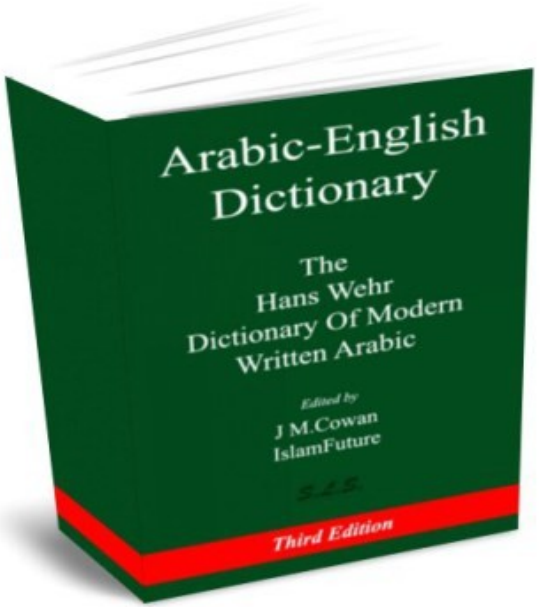
Interactive Exercises!

Source: alkitaabtextbook.com



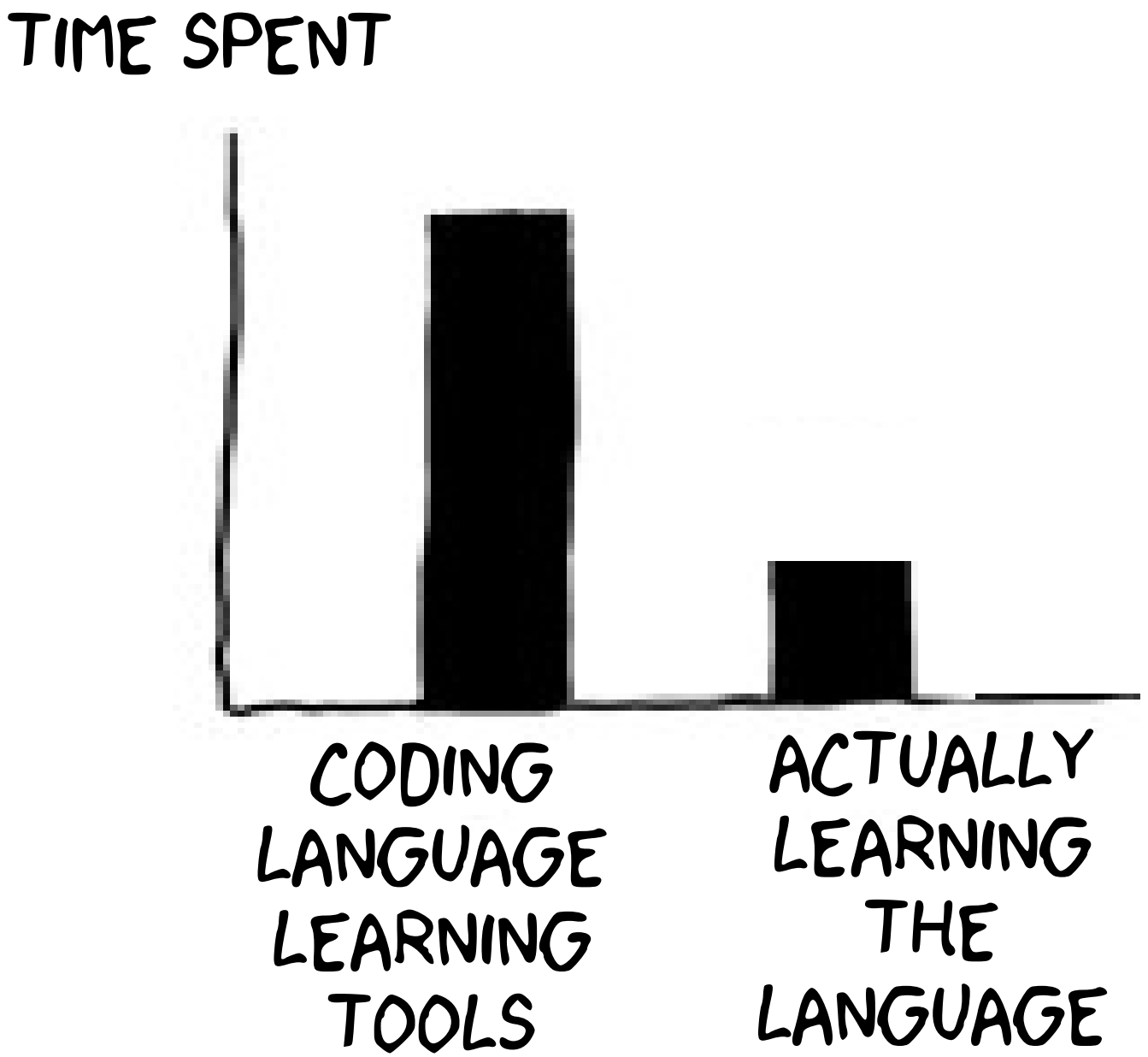
Spaced Repetition!

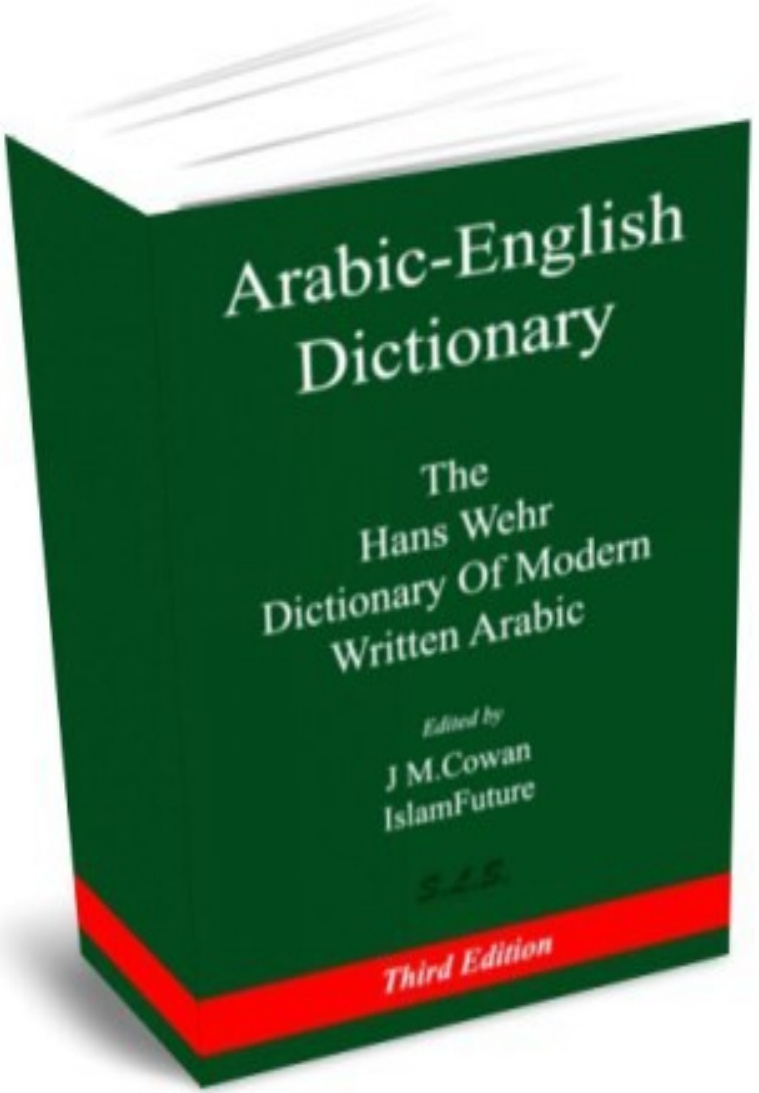
Source: futureummah.com



Source: islamfuture.wordpress.com

ISLAMFUTURE


TIME SPENT
CODING LANGUAGE LEARNING TOOLS
ACTUALLY LEARNING THE LANGUAGE



Source: islamfuture.wordpress.com

ISLAMFUTURE

Merci beaucoup!

Mercy boku?

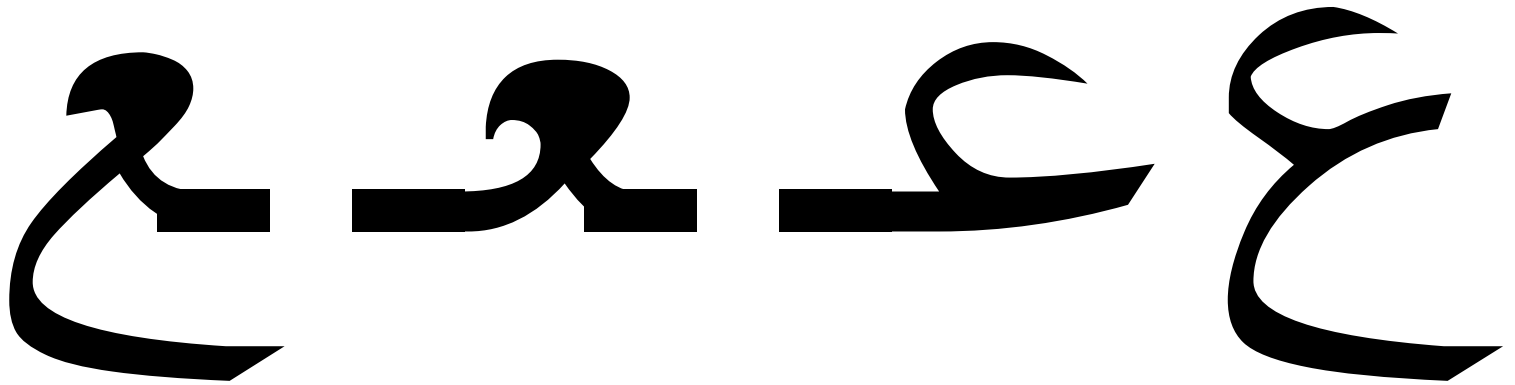
Source: www.collinsdictionary.com

Arabic orthography is more regular than French, but it has its own challenges

It goes right to left

مرحبا

Letters change shape based on context



THE INTERNATIONAL PHONETIC ALPHABET (revised to 1993)

CONSONANTS (PULMONIC)

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap				ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

Clicks		Voiced implosives		Ejectives	
ʘ	Bilabial	ɓ	Bilabial	ʼ	as in:
ǀ	Dental	ɗ	Dental/alveolar	pʼ	Bilabial
ǃ	(Post)alveolar	ʄ	Palatal	tʼ	Dental/alveolar
ǂ	Palatoalveolar	ɠ	Velar	kʼ	Velar
ǁ	Alveolar lateral	ʛ	Uvular	sʼ	Alveolar fricative

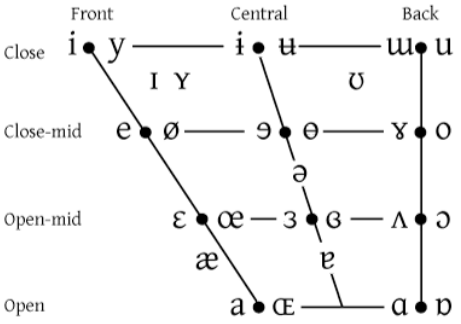
SUPRASEGMENTALS

ˈ	Primary stress	ˌfoʊnəˈtɪʃən	
ˌ	Secondary stress		
ː	Long	eː	
ˑ	Half-long	eˑ	
̆	Extra-short	ĕ	
.	Syllable break	ɹi.ækt	
|	Minor (foot) group		
‖	Major (intonation) group		
‿	Linking (absence of a break)		

TONES & WORD ACCENTS

LEVEL			CONTOUR	
˥ or ̋	Extra high	ě	˩˥	Rising
˦ or ́	High	ê	˥˩	Falling
˧ or ̄	Mid	ē	˦˥	High rising
˨ or ̀	Low	ě	˨˩	Low rising
˩ or ̏	Extra low	ȇ	˦˩	Rising-falling
↓	Downstep	↗	Global rise	etc.
↑	Upstep	↘	Global fall	

VOWELS



Where symbols appear in pairs, the one to the right represents a rounded vowel

OTHER SYMBOLS

ʍ	Voiceless labial-velar fricative
w	Voiced labial-velar approximant
ɥ	Voiced labial-palatal approximant
ʜ	Voiceless epiglottal fricative
ʢ	Voiced epiglottal fricative
ʡ	Epiglottal plosive
ɕ ʑ	Alveolo-palatal fricatives
ɺ	Alveolar lateral flap
ɧ	Simulataneous ʃ and x

Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary

k͡p t͡s

DIACRITICS

Diacritics may be placed above a symbol with a descender, e.g. ŋ̊

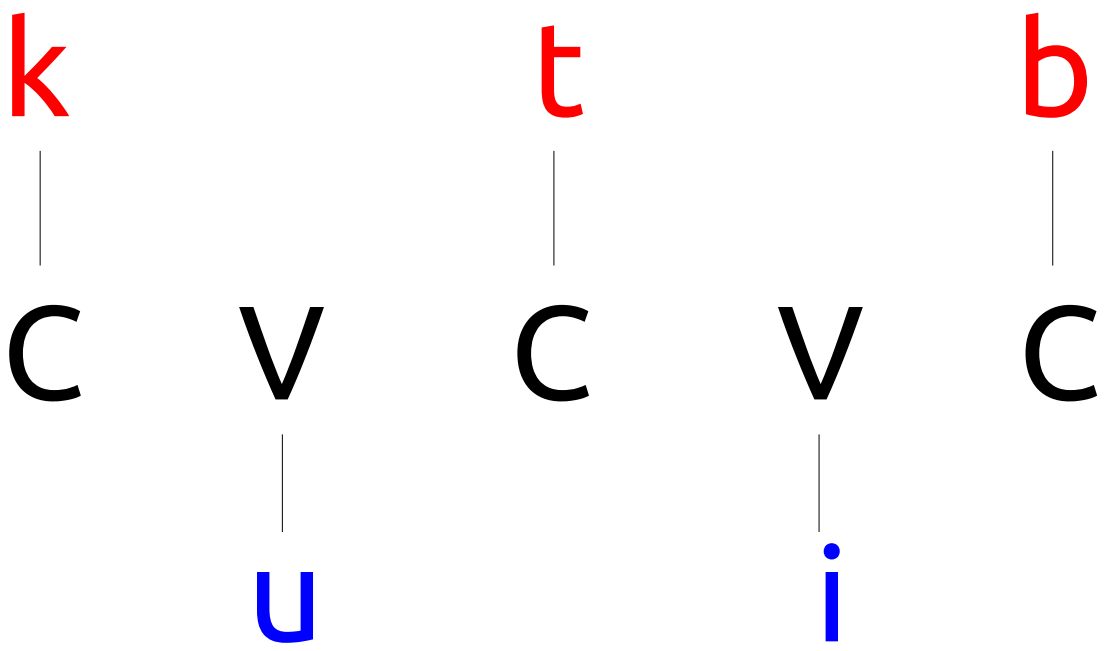
◌̥	Voiceless	n̥ d̥	◌̤	Breathy voiced	b̤ a̤	◌̪	Dental	t̪ d̪
◌̬	Voiced	s̬ t̬	◌̰	Creaky voiced	b̰ a̰	◌̺	Apical	t̺ d̺
◌ʰ	Aspirated	tʰ dʰ	◌̼	Linguolabial	t̼ d̼	◌̻	Laminal	t̻ d̻
◌̹	More rounded	ɔ̹	◌ʷ	Labialized	tʷ dʷ	◌̃	Nasalized	ẽ
◌̜	Less rounded	ɔ̜	◌ʲ	Palatalized	tʲ dʲ	◌ⁿ	Nasal release	dⁿ
◌̟	Advanced	u̟	◌ˠ	Velarized	tˠ dˠ	◌ˡ	Lateral release	dˡ
◌̠	Retracted	i̠	◌ˤ	Pharyngealized	tˤ dˤ	◌̚	No audible release	d̚
◌̈	Centralized	ë	~	Velarized or pharyngealized	ɫ			
◌̽	Mid-centralized	e̽	◌̝	Raised	e̝	(ɹ̝ = voiced alveolar fricative)		
◌̩	Syllabic	n̩	◌̞	Lowered	e̞	(β̞ = voiced bilabial approximant)		
◌̯	Non-syllabic	e̯	◌̘	Advanced Tongue Root	e̘			
◌˞	Rhoticity	ə˞	◌̙	Retracted Tongue Root	e̙			

Vowel length and gemination are contrastive

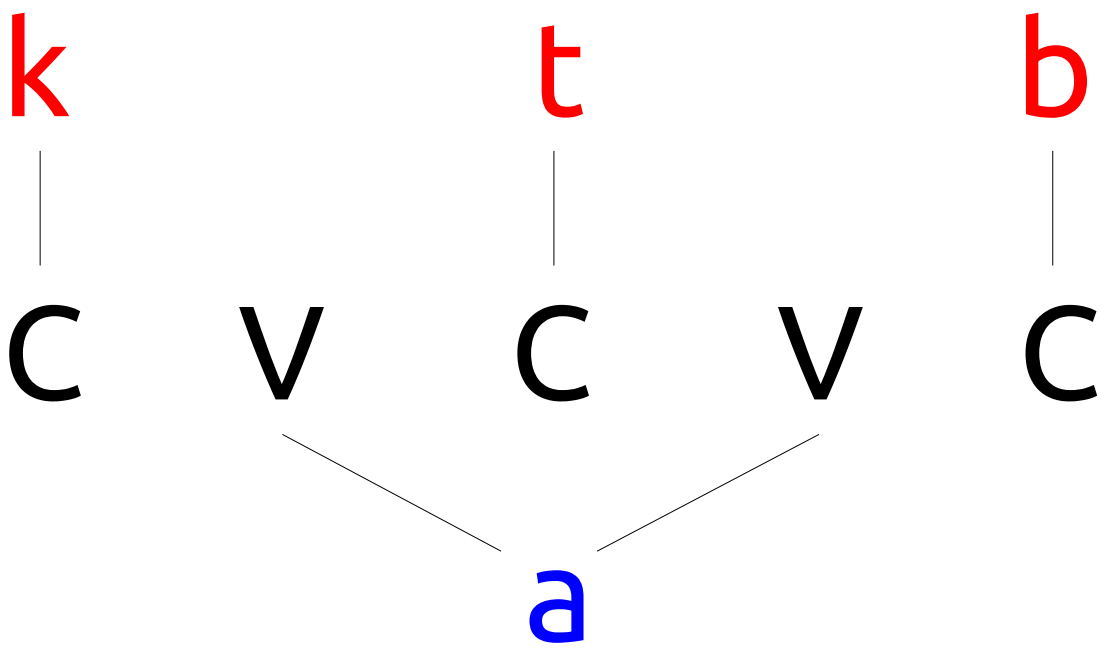
ḥamam	!=	ḥammam
pigeon	!=	bathroom

Arabic words are constructed differently:

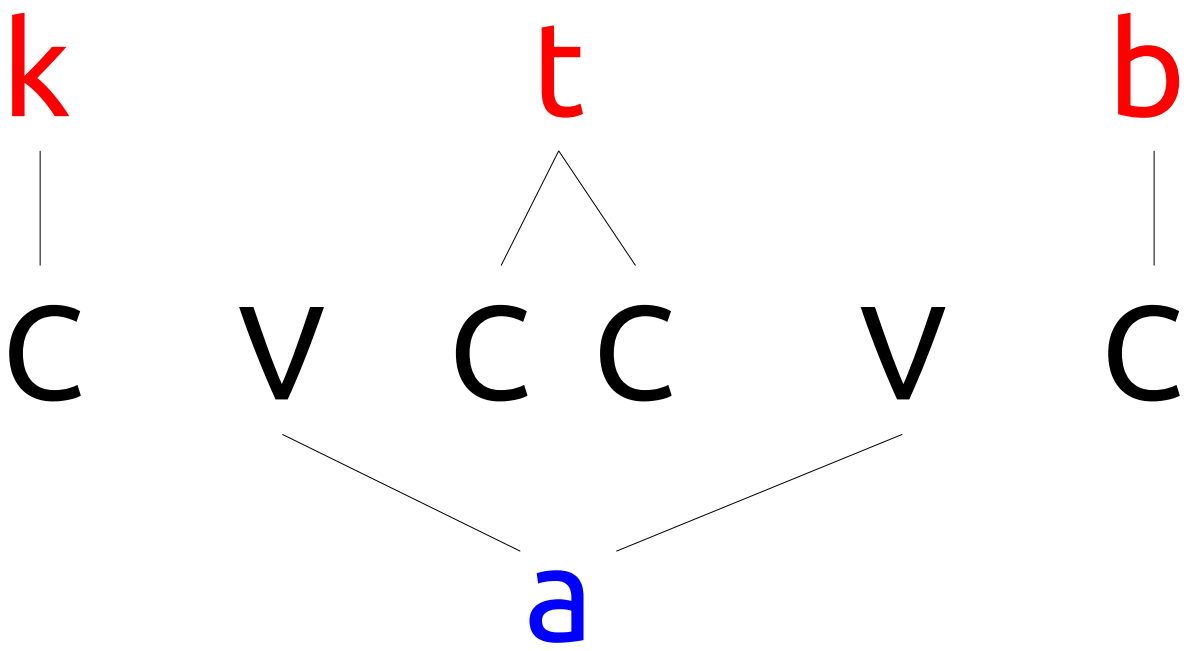
kataba	he wrote
kutiba	it was written
maktab	office
kitaab	book



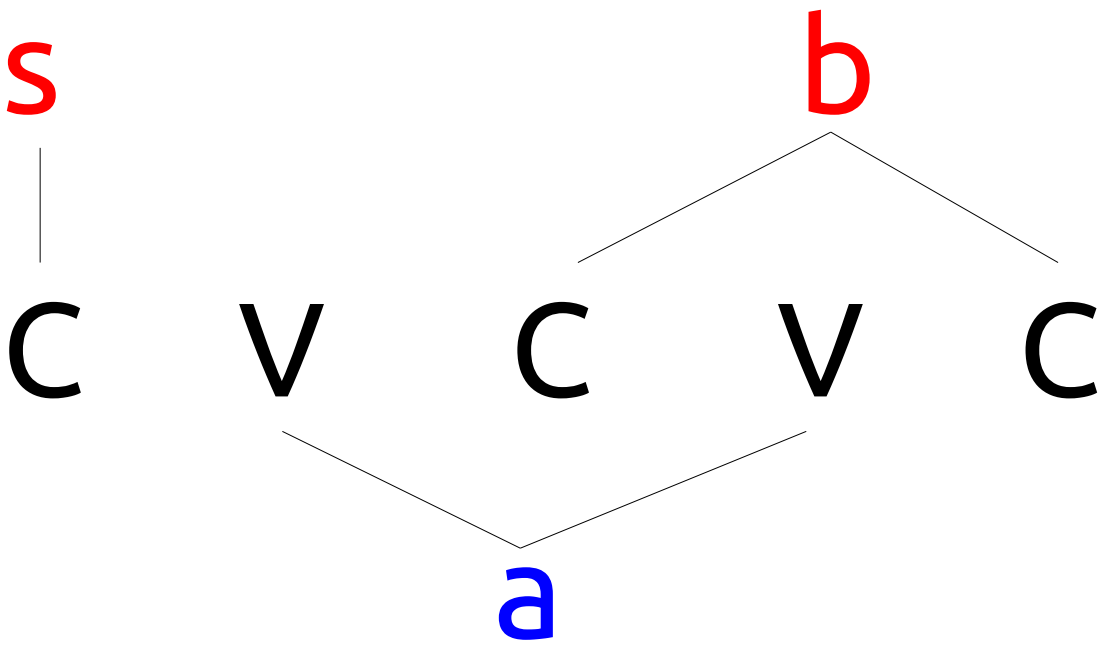
kutib



katab



kattab



sabab

كتب *kataba u* (*katb*, كتبة *kitba*, كتابة *kitāba*) to write, pen, write down, put down in writing, note down, inscribe, enter, record, book, register (هـ s.th.); to compose, draw up, indite, draft (هـ s.th.); to bequeath, make over by will (هـ ل s.th. to s.o.); to prescribe (هـ على s.th. to s.o.); to foreordain, destine (ل or هـ على s.th. to s.o.; of God); pass. *kutiba* to be rated, be foreordained, be destined (ل to s.o.) | كتب على نفسه ان to be firmly resolved to ..., make it one's duty to ...; كتب عنه to write from s.o.'s dictation; كتب كتابه (*kitābahū*) to draw up the marriage contract for s.o., marry s.o. (على to) II to make (ه s.o.) write (هـ s.th.); to form or deploy in squadrons (هـ troops) III to keep up a correspondence, exchange letters, correspond (ه with s.o.) IV to dictate (ه هـ to s.o. s.th.), make (ه s.o.) write (هـ s.th.) VI to write to each other, exchange letters, keep up a correspondence VII to subscribe VIII to write (هـ s.th.); to copy (هـ s.th.), make a copy (هـ of s.th.); to enter one's name; to subscribe (ل for); to contribute, subscribe (ل ب money to); to be entered, be recorded, be registered X to ask (ه s.o.) to write (هـ s.th.); to dictate (ه هـ to s.o. s.th.), make (ه s.o.) write (هـ s.th.); to have a copy made (ه by s.o.)

كتاب *kitāb* pl. كتب *kutub* piece of writing, record, paper; letter, note, message; document, deed; contract (esp. writing, script; inscription; writing, legend; placard, poster; piece of writing, record, paper; secretariat; written amulet, charm; pl. كتابات writings, essays; كتابة *kitābatan* in writing | بالكتابة written; بدون كتابة *bi-dūn k.* unwritten, oral; blank; كتابة التاريخ historiography, historical writing; كتابة الدولة *k. ad-daula* (*Magr.*) secretariat of stae; كتابة عامة (*'āmma*) secretariat general; اسم الكتابة *ism al-k.* pen name, nom de plume; آلة الكتابة typewriter; لغة الكتابة *lugat al-k.* literary language; ورق الكتابة *waraq al-k.* writing paper

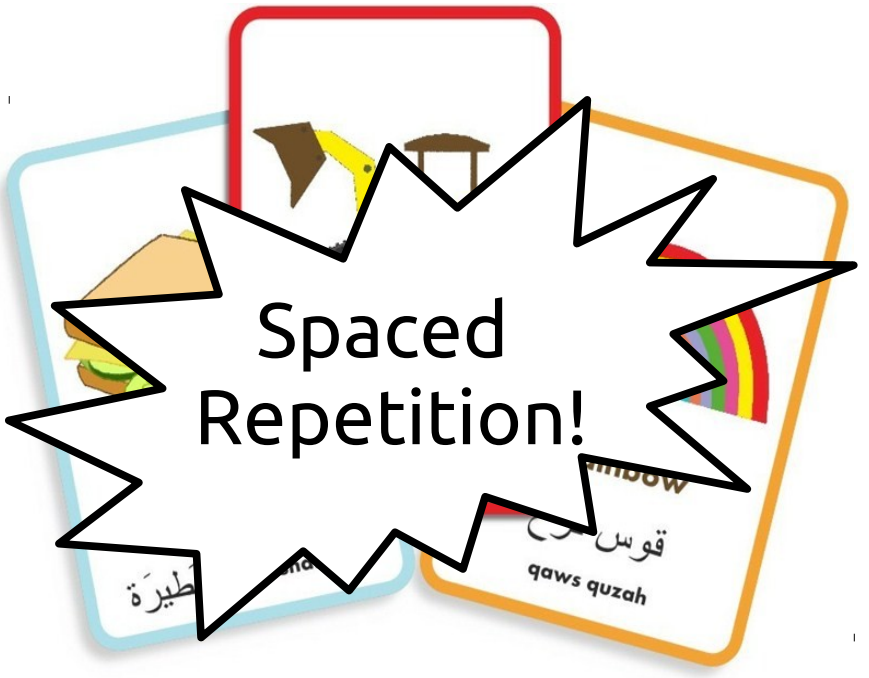
كتابي *kitābī* written, in writing; clerical; literary; scriptural, relating to the revealed Scriptures (Koran, Bible); kitabi, adherent of a revealed religion; the written part (of an examination) | اسلوب كتابي (*uslūb*) literary style; غلطة كتابية (*galṭa*) slip of the pen, clerical error; اعمال كتابية clerical work, office work, desk work; الكمال الكتابي (*kamāl*) literary perfection; لغة كتابية (*luga*) literary language; موظف كتابي (*muwaẓẓaf*) clerk, clerical worker (of a government office)

كتيبة *katība* pl. كتائب *katā'ib*[2] squadron; cavalry detachment; (*Eg.* 1939) battalion, (*Ir.* after 1922) regiment, (later) battalion, (*Syr.*) battalion of armored, cavalry, or motorized, unite (*mil.*); (piece of) writing, record, paper, document; written amulet

مكتب *maktab* pl. مكاتب *makātib*[2] office; bureau; business office; study; school,

Electronic dictionaries
need Arabic input,
so you need to know
how to type in Arabic

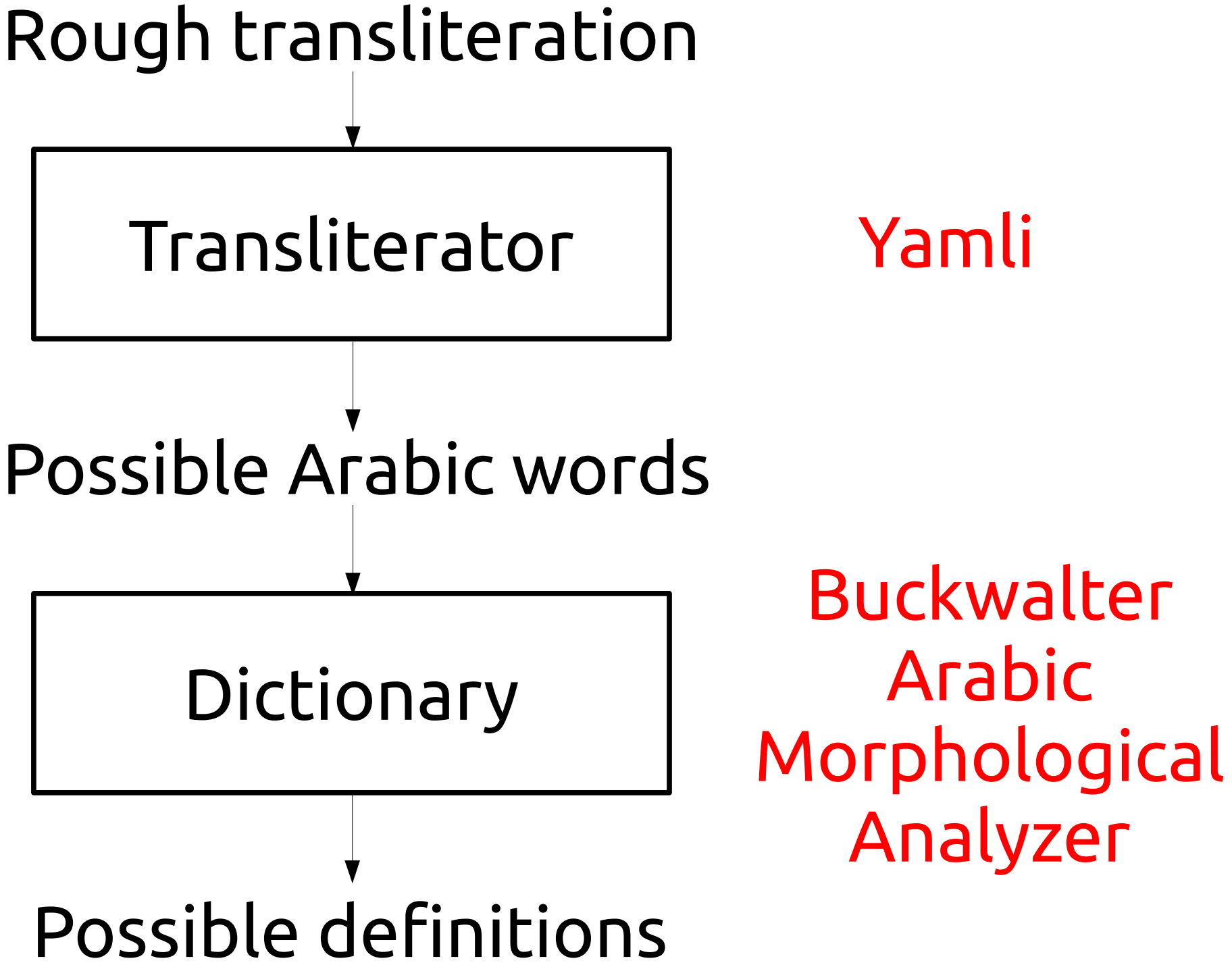
Interactive Exercises!



Spaced Repetition!

Fuzzy lookups!

ISLAMFUTURE


Rough transliteration
Transliterator
Yamli
Possible Arabic words
Dictionary
Buckwalter
Arabic
Morphological
Analyzer
Possible definitions

web | images | videos | news | wikipedia

marhaba

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Smart A f

marhaba

مرحبا

مرحبة

مرهبة

show more

New! Yamli offers **enterprise solutio**

search

editor

widgets

add to your site

```python
from flask import Flask, request, session, g, redirect, url_for, abort, \
     render_template, flash, jsonify
from flask.ext.cacheify import init_cacheify
from aramorph import analyser

# create the application
app = Flask(__name__)
app.config.from_object(__name__)

# views
@app.route('/')
def main():
    return render_template('yamli.html')

@app.route('/query_ajax', methods=['POST'])
def query():
    if request.json and 'words' in request.json:
        results = cache.get(request.json['words'])
        if results is None:
            results = list()
            words = request.json['words'].split(",")
            for word in words:
                for analysis in analyser.ai.analyse_arabic(word):
                    if analysis and analysis not in results:
                        results.append(analysis)
        return jsonify(analyses=results), 201

if __name__ == '__main__':
    app.run(debug=False)
```

Fuzzy Arabic Dictionary

Look up Arabic words without needing to know how to spell.
Powered by Yamli and the Buckwalter Morphological Analyzer.
Glued together by Michelle Fullwood with Flask. More »

hamam

Try: 3raby, kitab, madrasa, afrit, istaktab

حمام	حَمام	ḥamam	Root: حم	Noun	dove;pigeon
حمام	حَمام	ḥamam		Proper noun	Hamam
حمام	حَمّام	ḥammam	Root: حم	Noun	bath
همام	هَمّام	hammam	Root: هم	Noun	energetic;anxious
همام	هُمام	humam	Root: هم	Noun	magnanimous;heroic
همام	هِمام	himam	Root: هم	Noun	magnanimous;heroic
همم	هِمَم	himam	Root: هم	Noun	ambitions;aspirations
حمم	حَمَّمَ	ḥammama	Root: حم	Perfect verb	make hot;wash + he/it
حمم	حُمَم	ḥumam	Root: حم	Noun	magma;cinders

Source: www.pavemanpro.com

Links:

- fuzzyarabic.herokuapp.com
- github.com/michelleful

Thanks to:

- Yamli
- Tim Buckwalter (BAMA)
- Alex Lee (pyaramorph)