

STANDARDIZING FUNCTIONAL TESTING OF MUTUAL INTELLIGIBILITY IN ARABIC DIALECTOLOGY: METHODS AND TOOLS

Slavomír /bulbul/ Čéplö^{†1}, Ján Bátora[#],
Adam Benkato[‡], Christophe Pereira^{*},
Jiří Milička[‡], Petr Zemánek[‡]

1 Corresponding author, bulbul@bulbul.sk

[†] Institute of the Czech National Corpus, Faculty of Arts, Charles University

[‡] Institute of Comparative Linguistics, Faculty of Arts, Charles University

[‡] School of Oriental and African Languages, London

^{*} Institut national des langues et civilisations orientales, Paris

[#] Sonic Studio s.r.o., Bratislava



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Mutual Intelligibility of Arabic Varieties

Many opinions ...

“...neighboring vernacular dialects such as Jordanian and Syrian are easily mutually **intelligible** to native Arabic speakers...”
(Ryding 2005: 6)

“... MSA is the lingua franca of the whole Arab world where a number of mutually **unintelligible** dialects occur.”
(Abu-Haidar 2000: 93)

... a lot of anecdotal evidence ...

“I've always had a hard time communicating with Yemenis, as they seem to have a **completely different vocabulary** from most other Arab dialects...”

<http://forum.wordreference.com/showthread.php?t=417867>

- doubly so on outlier varieties -

“Maltese can hardly be said to belong to the broader Arabic speech community, since Maltese is mutually **unintelligible** with them.” (Owens 2010: 117)

“We Tunisians **understand** Maltese **perfectly!**”
(Every Tunisian ever)

... but no hard data.



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Mutual Intelligibility of Arabic Varieties

Charles University in Prague GAUK 58313/2013

“Mutual intelligibility of Arabic dialects
functionally tested - a pilot study”

Primary goal: to settle the question of mutual intelligibility of Maltese with Maghribī Arabic

Secondary goal: to evaluate the methodology and pave way for further study of mutual intelligibility of varieties of Arabic



November 2013 – March 2014

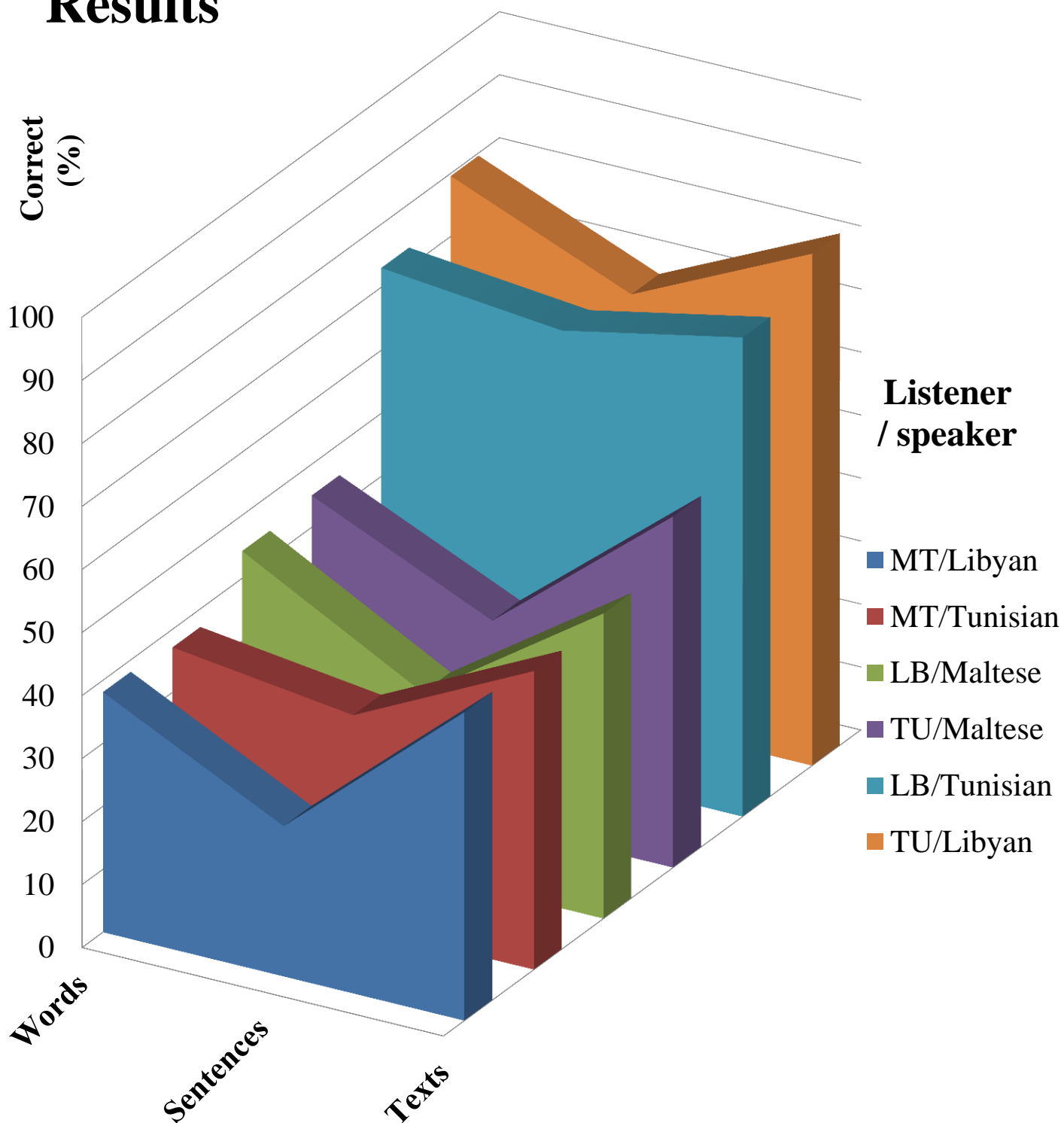
Libyan Arabic (Benghazi), Tunisian Arabic (Tunis),
Maltese



The research underlying this paper was conducted at the Faculty of
Arts of the Charles University and supported by the Grant Agency of
the Charles University, project no. GAUK 58313/2013



Results



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Test Design

Tang Chaoju and Vincent J. van Heuven.
“Mutual intelligibility of Chinese dialects
experimentally tested.”
Lingua 119 (2009), 709–732.

Audio-based test:

1. Word test
2. Sentence test
- +
3. Text test



The research underlying this paper was conducted at the Faculty of
Arts of the Charles University and supported by the Grant Agency of
the Charles University, project no. GAUK 58313/2013



Test Administration

Challenges

1. Test administration (respondent information collection > play audio > display instructions > record response > evaluate)
2. Test selection and randomization

	MT	LB	TU
MT	-	x	x
LB	x	-	x
TU	x	x	-

	LB	TU
Word01	MT _n	MT _{n+1}
Word02	MT _{n+1}	MT _n
Word03	MT _{n+1}	MT _n
Word04	MT _n	MT _{n+1}
Sentence01	MT _{n+1}	MT _n
Sentence02	MT _n	MT _{n+1}
Sentence03	MT _n	MT _{n+1}
Sentence04	MT _{n+1}	MT _n
Text01	MT _n	MT _{n+1}
Text02	MT _{n+1}	MT _n

3. Portability
4. Flexibility



Test Administration

Solution



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



FILOZOFICKÁ FAKULTA
UNIVERZITY KARLOVY
V PRAZE

LingTest 1.0b27: General

Inherent platform advantages

Audio and video playback + recording

Touch screen interface

Portability

Reliability

App design

Separate functionality from content (flexibility)

Provide simple and open way of data import / export

Integrate automatic and manual evaluation

Ultimate goal

~~World domination~~

Standard set of tools and protocols to deliver meaningful and comparable data



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



LingTest 1.0b27: Data structure

Data package structure (*.zip)

words.xml	MT_S001C01.m4a
texts.xml	MT_W001C01.m4a
sentences.xml	TU_S001C01.m4a
init.xml	TU_W001C01.m4a
cat1.png	MT_T001.m4a
cat2.png	TU_T001.m4a

Structure of words.xml

```
<words>
  <categories>
    <category id="1" img="cat1.png" name="حيوانات"/>
    <category id="2" img="cat2.png" name="اعضاء الجسم"/>
    <category id="3" img="cat3.png" name="اللبس و المجوهرات"/>
    <category id="4" img="cat4.png" name="اللون و الاشكال"/>
    <category id="5" img="cat5.png" name="الاكل و الشرب"/>
    <category id="6" img="cat6.png" name="العواطف"/>
    <category id="7" img="cat7.png" name="العائلة و الناس"/>
    <category id="8" img="cat8.png" name="في البيت"/>
    <category id="9" img="cat9.png" name="الاتجاه"/>
    <category id="10" img="cat10.png" name="الوقت و التاريخ"/>
    <category id="11" img="cat11.png" name="الدنيا و الهيئة"/>
  </categories>
  <howto dir="rtl">مثلاً. يعني مجموعة كلمات مرتبطة.
  كلب -> الحيوانات
  امرأة -> الناس
  قميص -> ملابس
  يسار -> اتجاه
  سوف تسمع صوت قصير قبل الكلمة. بعد ما تسمع الكلمة، اختار المجموعة، يعني اضغط الزر المناسب للمجموعة. ع
  ندما تكون جاهزاً لتسمع الكلمة التالية، اضغط التالي
</howto>
<task>الرجاء اختيار للكلمة مجموعة موازنة</task>
<language id="1">
  <word id="1" file="MT_W001C01.m4a" code="W001C01" word="kelb" category="1"/>
  <word id="2" file="MT_W002C01.m4a" code="W002C01" word="ḥṣān" category="1"/>
  <word id="3" file="MT_W003C01.m4a" code="W003C01" word="arnab" category="1"/>
  <word id="4" file="MT_W004C01.m4a" code="W004C01" word="gaṭṭūs" category="1"/>
</language>
```



LingTest 1.0b27: Admin interface

iPad 16:12 31 %

Results (26)

Test Packages

Malta	MMT_package-Malta.zip, imported on 11.11.2013 0:03, lb/tu
Libya	Libya.zip, imported on 26.1.2014 16:12, mt/tu
Tunisia	Tunisia.zip, imported on 26.1.2014 16:12, mt/lb

Close **Libya** Delete

Filename: Libya.zip
Imported on: 26.1.2014 16:12
Language 1: Maltese - 160 words, 60 sentences, 2 texts
Language 2: Tunisian Arabic - 160 words, 60 sentences, 2 texts
Answered 0 times

UI Language: English Česky Malti العربية

Word test: ☒ Words: 80 (number of randomly selected words per language)

Sentence test: ☒ Sentences: 30 (number of randomly selected sentences per language)

Text test: ☒ Texts: 1 (number of randomly selected texts per language)

Start test



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



LingTest 1.0b27: Respondent info

iPad 16:13 31 %

الغاء

الرجاء ادخال معلوماتك هنا و اضغط ارسال

اسم

العمر

مولود في

اخر خمس سنوات ساكن في

مساوى تعليمك ☐ لا شيء ☐ ابتدائي ☐ الثانوية ☐ الجامعة

لغة تعليمك

لغة بوك

لغة امك

ارسال



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



LingTest 1.0b27: Instructions

iPad 16:13 31 %

مرحباً لاختبار الكلمات

سوف تسمع عدة كلمات و عليك التعيين لكل كلمة مجموعة، يعني مجموعة كلمات مرتبطة. مثلاً

كلب -> الحيوانات
مرأة -> الناس
قميص -> ملابس
يسار -> اتجاه

سوف تسمع صوت قصير قبل الكلمة. بعد ما تسمع الكلمة، اختار المجموعة، يعني اضغط الزر المناسب للمجموعة. عندما تكون جاهزاً لتسمع الكلمة التالية، اضغط التالي.

اضغط على الزر لتجرب درجة الصوت و تعدله كما تريد.
عندما تكون جاهزاً لبدء الاختبار اضغط 'التالي'

شغل الصوت للاختبار

التالي



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Word Test: Design and composition

Task

Semantic classification

160 items in 11 semantic categories

Selection criteria:

1. Frequency
2. Low neighborhood density
3. Unambiguous membership in the semantic category

Animals	dog, mouse, horse ...
Body parts	hand, eye, hair ...
Clothing and jewelry	shirt, belt, pocket ...
Colors, shapes and properties	white, long, heavy ...
Eating and drinking	bread, water, egg ...
Emotions	angry, fear, hope ...
Family and other people	human being, brother ...
In the house	door, window, key ...
Orientation in space	here, left, east ...
Time	now, never, hour ...
World around us	world, city, sun ...



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Word Test: Administration

iPad 16:13 31 %

الغاء

كلمة 1 من 160 تحت الاختبار

الرجاء اختيار للكلمة مجموعة موازية

 <p>حيوانات</p>	 <p>اعضاء الجسم</p>	 <p>الدبش و المجوهرات</p>	 <p>الالوان و الاشكال</p>
 <p>الاكل و الشرب</p>	 <p>العواطف</p>	 <p>العائلة و الناس</p>	 <p>في البيت</p>
 <p>الاتجاه</p>	 <p>الوقت و التاريخ</p>	 <p>الدنيا و الهيئة</p>	

التالي



Word Test: Evaluation

iPad 16:16 31 %

< Return Email All Export All

Test Packages

Respondent [REDACTED] 11.11.2013 14:49

Malta Processed: ☒

RESPONDENT INFO

[REDACTED]

WORD TEST ANSWERS

tu-W145C10 (siegha): category 10, answered 2	
tu-W146C11 (art): category 11, answered 1	
tu-W151C11 (gholja): category 11, answered 2	
tu-W121C09 (wara): category 9, answered 3	
lb-W012C01 (lupu): category 1, answered 9	
tu-W074C06 (ferhan): category 6, answered 6	✓
lb-W053C04 (tond): category 4, answered 10	
lb-W100C07 (tarbija): category 7, answered 10	
tu-W006C01 (ghasfur): category 1, answered 1	✓
tu-W085C06 (jhobb): category 6, answered 7	
tu-W013C01 (naghga): category 1, answered 1	✓
tu-W018C02 (rigel): category 2, answered 2	✓
lb-W047C04 (isfar): category 4, answered 4	✓
lb-W060C05 (ilma): category 5, answered 9	
tu-W152C11 (muntanja): category 11, answered 7	
lb-W061C05 (haxix): category 5, answered 4	
tu-W066C05 (melh): category 5, answered 5	✓
tu-W067C05 (ghenoh): category 5, answered 7	

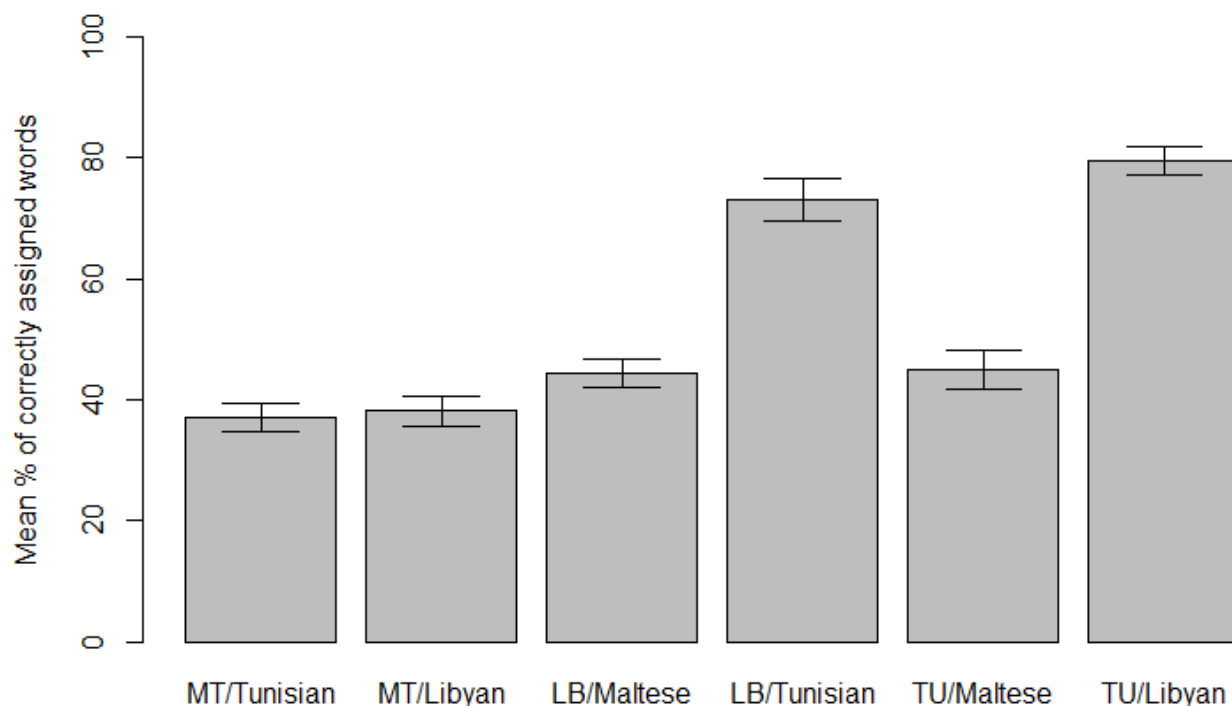


The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Word Test: Results

Mean word scores (country / tested variety)



Word test

Correctly assigned words (mean for all respondents, in %)

Country / Language	Maltese	Benghazi Arabic	Tunisian Arabic
Malta	x	38.13%	37.14%
Libya	44.32%	x	73.07%
Tunisia	45.00%	79.58%	x



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Sentence Test: Design and composition

Tang and Van Heuven 2009: high predictability SPIN test, single targeted keyword (Kalikow et al. 1977)

Task

“Write down the last word you heard.”

Our test: Bamford-Kowal-Bench Standard Sentence Test, multiple (3-4) targeted keywords (Bent and Bradlow 2003)

Task

“Write in your own language what you’ve heard and understood.”

60 simple sentences with 3-4 keywords each

Wash your *hands* with *soap*.

The *boy* *broke* his *leg*.

How many children do you *have*?

The *birds* are *dying* from *heat*.

Do *not add more salt*!

People fast during *Lent/Ramadan*.

Is *it true* or *not*?



Sentence Test: Administration

iPad 16:14 31 %

الغاء

جملة 1 من 2 تحت الاختبار

اكتب بلغتك ما سمعته و فهمته. إن لم تسمع شيء، اكتب 'ا' (حرف الف).

لوحه مفاتيح حرية الكتابة على الشاشة مباشرة

--	--

ض ص ث ق ف غ ع ه خ ح ج

ة ك م ن ت ا ل ب ي س ش

ء ظ ط ذ د ز ر و ى ، التالي

٩٣٢١ ٩٣٢١



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Sentence Test: Evaluation

iPad 21:03 20 %

< Return Email All Export All

Test Packages

Respondent [redacted] 24.2.2014 12:11

Tunisia Processed: ☒

lb-S040C06 (nḥəss fi barša wuḏīʿa fi sədri)

"نحس في وجعة قوية في صدري"

nḥəss Correct

barša Correct

wuḏīʿa 25% correct

sədri Correct

lb-S025C04 (ḥəyya nəmšīw qbəl ma itīḥ əl-līl)

"هياة نمشيو قبل ما تضلام"

ḥəyya Correct

nəməšīw Correct

qbəl Correct

itīḥ əl-līl 50% correct

lb-S033C05 (l-bnēt qāʿdīn yēklu f əl-xobəz b əz-zīt)

البنات ياكلوا
في خبز الزيت

l-bnēt Correct

yēklu Correct

əl-xobəz Correct

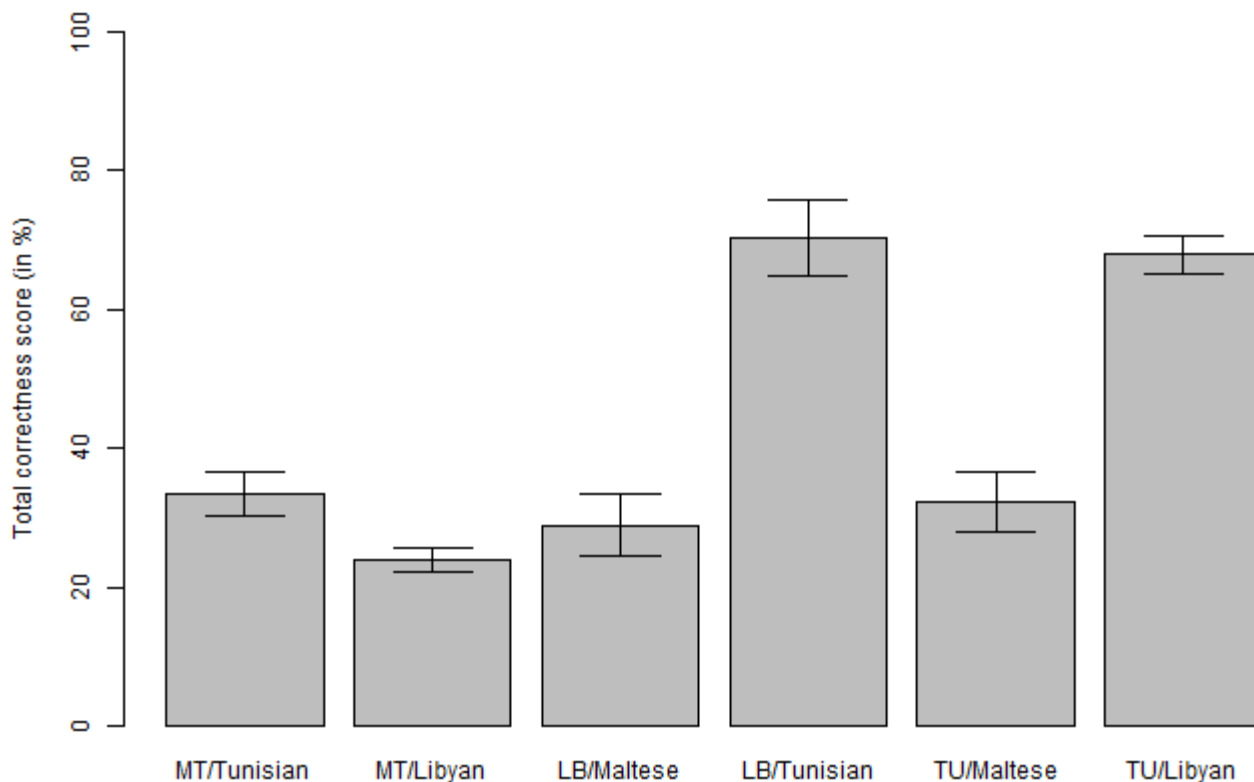


The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Sentence Test: Results

Mean sentence scores (country / tested variety)



Sentence test

Mean TCS score for the sentence test (for all respondents, in %)

Country / Language	Maltese	Benghazi Arabic	Tunisian Arabic
Malta	x	23.86%	33.39%
Libya	28.90%	x	70.16%
Tunisia	32.18%	67.80%	x



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Text Test: Design and composition

2 short texts of < 400 words (≈ 3 minutes)

Why 2? Each respondent tests 2 languages

Selection criteria

1. Simple and comparable vocabulary level
2. Simple structure

T001 is taken from a textbook of Maltese as FL

T002 from elementary school test materials

Task

1. Text played twice
2. 8 questions with 4 options each of which exactly 1 is correct



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Text Test: Administration

iPad 17:42 26 %

الفاء

اختبار الفهم 1 من 2 تحت الاختبار

ما هو اسم الشخصية الرئيسية في القصة؟

مارك

شان

يوسف

ادم

التالي



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Text Test: Evaluation

iPad 16:16 31 %

< Return Email All Export All

Test Packages

Respondent [redacted] 11.11.2013 14:49

Malta

Processed: ☒

jghixu Incorrect

erba' Correct

snin Correct

tu-S001C01 (Aħsel idejk bis-sapun.)

"aħsel idek bis-sapun"

Aħsel Correct

idejk 75% correct

bis-sapun Correct

TEXT COMPREHENSION TEST ANSWERS

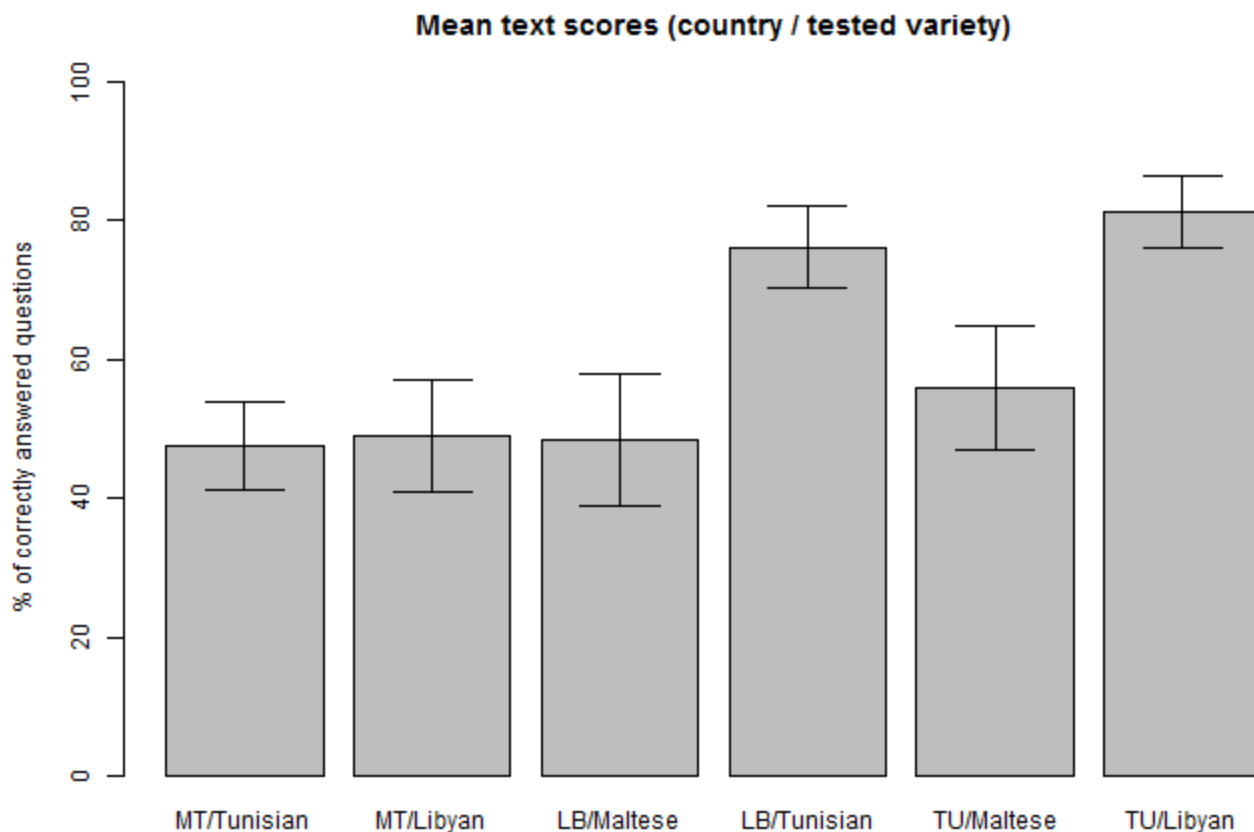
lb-T002, q #1 (It-tifel tal-istorja jismu): correct 1, answered 1	✓
lb-T002, q #2 (It-temp kien): correct 2, answered 3	
lb-T002, q #3 (It-tifel mar passigġata): correct 3, answered 3	✓
lb-T002, q #4 (Kif inqata' mill-art it-tifel għall-ewwel): correct 2, answered 2	✓
lb-T002, q #5 (It-tifel għadda minn fuq): correct 3, answered 4	
lb-T002, q #6 (Sa minn ċkunitu t-tifel kien jixtieq): correct 1, answered 1	✓
lb-T002, q #7 (Meta fetaħ għajnejh it-tifel sab ruħu): correct 2, answered 2	✓
lb-T002, q #8 (X'għamlet ommu kif qalilha bil-holma?): correct 2, answered 2	✓
tu-T001, q #1 (Xi ġralu sid il-kelb?): correct 1, answered 3	
tu-T001, q #2 (Is-sid tal-kelb stieden lil ħbiebu biex): correct 3, answered 3	✓
tu-T001, q #3 (Fejn mar il-kelb?): correct 2, answered 1	
tu-T001, q #4 (Il-kelb iltaqa' ma'): correct 1, answered 2	
tu-T001, q #5 (X'qal il-kelb il-abjad lill-klieb l-oħra?): correct 4, answered 2	
tu-T001, q #6 (Xi ġralu l-kelb l-abjad waqt l-ikla?): correct 4, answered 1	
tu-T001, q #7 (Kif ġab ruħu l-kelb il-abjad wara dan?): correct 2, answered 2	✓
tu-T001, q #8 (Il-klieb l-oħra jieklu): correct 4, answered 4	✓



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Text Test: Results



Text test

Correct answers (mean for all respondents, in %)

Country / Language	Maltese	Benghazi Arabic	Tunisian Arabic
Malta	x	48.96%	47.40%
Libya	48.44%	x	76.04%
Tunisia	55.73%	81.25%	x



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Text Test: Issues

Average of correctly answered question for either text (in %) with significance test p-values

(Calculated using R function `t.test()` to perform a paired two-tailed Welch's t-test with 95% confidence interval)

Country / Language	Maltese T001 / T002	p-value
Malta	x	x
Libya	38.54% / 58.33%	0.02
Tunisia	40.63% / 70.83%	0.002

Country / Language	Benghazi Arabic T001 / T002	p-value
Malta	35.42% / 62.5%	0.001
Libya	x	x
Tunisia	79.17% / 83.33%	0.5

Country / Language	Tunisian Arabic T001 / T002	p-value
Malta	39.58% / 55.2%	0.06
Libya	67.7% / 84.38%	0.02
Tunisia	x	x



Results: Export

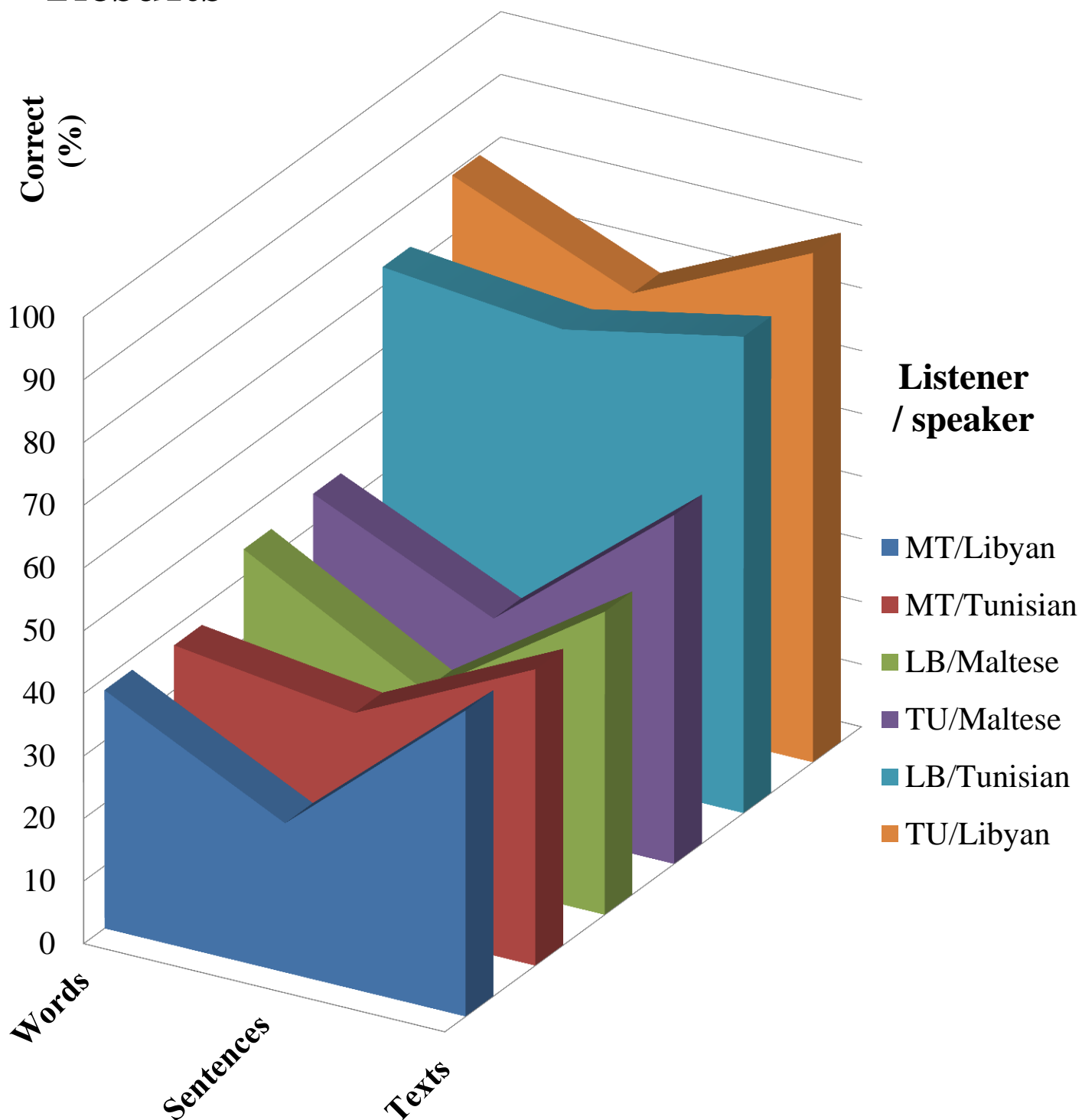
```
<?xml version="1.0" ?>
<answer id="10" pkg="19" date="2014-02-25 10:45:16 +0000" ui_lang="3">
  <respondent>
    <name>          </name>
    <age>    </age>
    <born>tunis</born>
    <lived>tunis</lived>
    <school_lang>arabe francais anglais</school_lang>
    <fathers_lang>tounsi</fathers_lang>
    <mothers_lang>tounsi</mothers_lang>
  </respondent>
  <words>
    <word id="6">
      <num>0</num>
      <code>W006C01</code>
      <category>1</category>
      <response>1</response>
      <correct>1</correct>
    </word>
  </words>
  <sentences>
    <sentence id="78">
      <num>0</num>
      <code>S018C03</code>
      <response>wsa5 3al rmal fil b7ar</response>
      <keyword_0>Not answered</keyword_0>
      <keyword_1>Not answered</keyword_1>
      <keyword_2>50% correct</keyword_2>
      <keyword_3 targeted="1">50% correct</keyword_3>
    </sentence>
  </sentences>
  <texts>
    <text id="1">
      <question id="1">
        <num>0</num>
        <code>T001</code>
        <answer>1</answer>
        <response>1</response>
        <correct>1</correct>
      </question>
      <question id="2">
        <num>1</num>
        <code>T001</code>
        <answer>3</answer>
        <response>3</response>
        <correct>1</correct>
      </question>
    </text>
  </texts>
</answer>
```



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Results



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Your feedback

Test design

- Test types
- Test content
- ...

Application design and functionality

- Add test types (picture, cloze)
- Add functionality (video playback, response recording)
- ...



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013



Thanks!

شكرا

Grazzi!



The research underlying this paper was conducted at the Faculty of Arts of the Charles University and supported by the Grant Agency of the Charles University, project no. GAUK 58313/2013

