

Native English speakers learning Arabic:  
The influence of novel orthographic information  
on second language phonological acquisition

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# Introduction

- Orthographic input can hinder phonological acquisition (e.g., Bassetti, 2006; Hayes-Harb, Nicol, & Barker, 2010)
- Orthographic input can aid phonological acquisition (e.g., Escudero, Hayes-Harb, & Mitterer, 2008)
- Unfamiliar orthographic symbols can also aid learners (Showalter & Hayes-Harb, 2013)

# Showalter & Hayes-Harb (2013)

- Previous studies utilized familiar orthographic symbols and relied on learners' knowledge of existing L1 grapheme-phoneme correspondences
- Can native English speakers use orthographic tone marks to remember the lexical tones associated with new L2 words?
- L1 English, L2 pseudo-Mandarin
- Mandarin four-way lexical tone contrast (tones 1,2,3,4)
- Pinyin: Romanized Mandarin writing with diacritic tone marks, e.g. <fiàn>

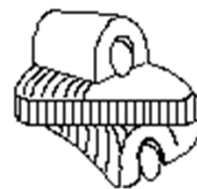
# Experiment 1

Word Learning Phase Example: Hear [gi-tone1], See:



gi

*No Tone Marks*

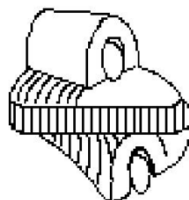


gī

*Tone Marks*

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Test Phase Example: Hear [gi-tone2], See:



**MISMATCHED**

Respond: *Matched or Mismatched*

Showalter & Hayes-Harb, 2013

# Experiment 2

- Did subjects learn what tones are indicated by each tone mark or did they simply pay better attention to the auditory forms because they notice that tone marks differed across words?
- Stimuli: all stimuli used were the identical to Experiment 1
- Procedures: all procedures from Experiment 1 were the same except the Final Test.
  - Orthographic representations NOT nonobject pictures
  - Same number of mismatched/matched items

fiàn

Mismatched: [fian]- tone 3

# Showalter & Hayes-Harb Findings

- On items that probed sensitivity to tone contrasts, subjects who saw tone marks significantly outperformed those who did not
- The availability of orthographic tone marks can help learners remember lexical tone
  - Learners can create novel tone-tone mark correspondences to some extent
- Even unfamiliar orthographic symbols can influence L2 word form learning

# Present Study

- We do not yet know whether learners can use an ***entirely unfamiliar*** orthography to make inferences about the phonological structure of L2 words...
- Can learners use their knowledge that letters represent sounds to infer phonological contrasts in new L2 words even when the orthography is entirely unfamiliar?

# Experiment 1

- L1 English, L2 pseudo-Arabic
- Two conditions (n=15 in each)
  - Orthography Condition: Arabic script
  - Control Condition: meaningless Arabic sequence <ط ط ط ط>
- Materials
  - Arabic velar-uvular contrast /k-q/
  - Words produced by **two** male native Jordanian Arabic speakers
  - 6 nonword minimal pairs, e.g., [kubu]-[qubu]



# Word Learning Task

- Each of the nonwords was associated with a different picture
  - E.g., for the auditory forms [kubu] and [qubu], subjects in the Orthography group saw:



كوبو



قوبو



- And the control group saw:



ط ط ط ط



ط ط ط ط

# Word Learning Task

- Each auditory word and corresponding picture presented twice per block (24 items per block)
- Block presented four times, in a different random order each time and for each subject
- No response required of subjects; told to learn the words and their meanings as well as possible
- Word Learning: Auditory + Picture + Orthography

# Criterion Test

- Two-way forced-choice auditory word-picture matching test
- 48 items: 24 matched, 24 mismatched
  - **Matched**: e.g., see picture of [kita], hear [kita]
  - **Mismatched**: e.g., see picture of [kita], hear [qaʃu]
- Tested **only** the ability to discriminate among very different words (e.g., [kita]-[qaʃu]), **not** minimal pairs
- Subjects repeated word learning until 90% accuracy reached

# Final Test

- Identical to Criterion Test, except:
- Mismatched items were minimal pairs
  - e.g., see picture of [kubu], hear [qubu]

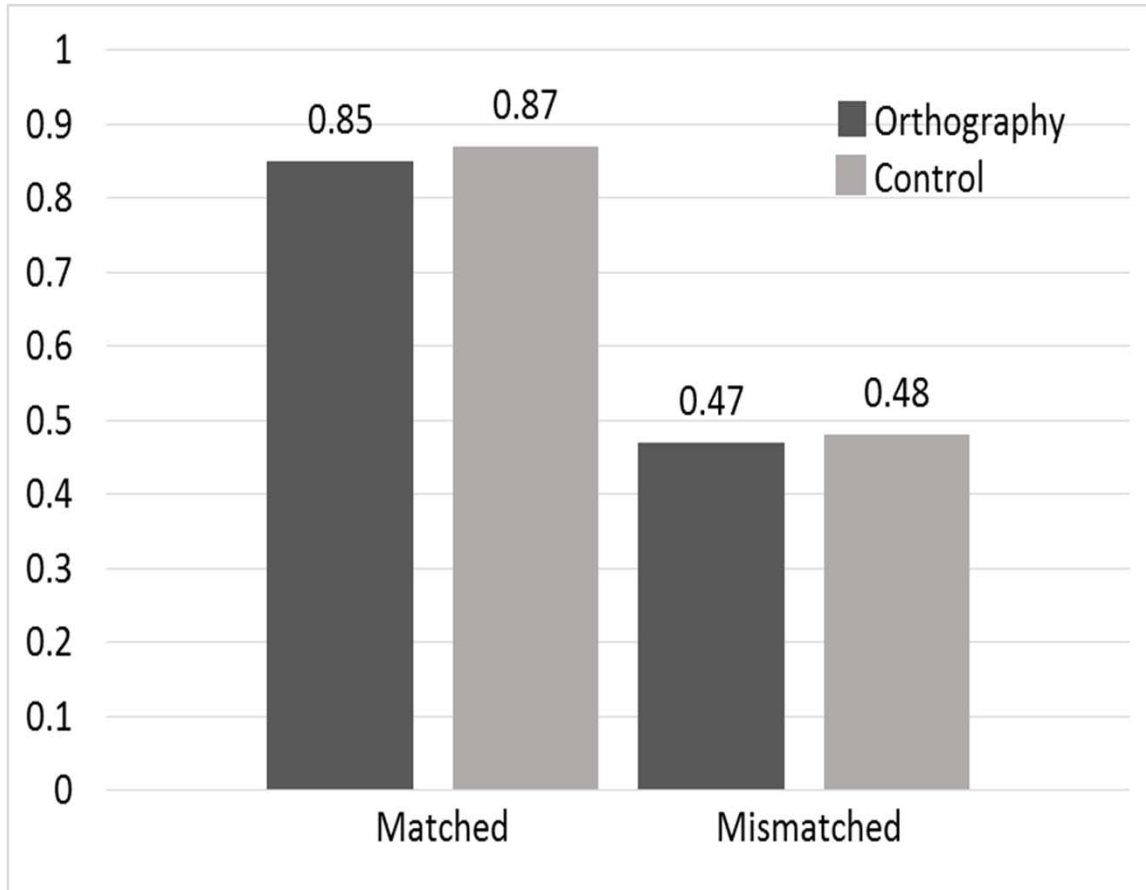


[kubu]  
matched



[qubu]  
mismatched

# Experiment 1 Findings



- Main effect of item type sig. ( $p < .005$ )
- Main effect of group not sig. ( $p = .661$ )
- Interaction of item type and group not sig. ( $p = .867$ )

# Experiment 1 Conclusions

- Native English-speaking learners did not benefit from the availability of the Arabic spelled forms when discriminating between /k-q/ minimal pairs
- Three possible explanations:
  - The Arabic ***script is too visually complex***
  - The novel ***auditory contrast is too difficult*** for learners to perceive
  - Some combination of the above

# Experiment 2

- Is the Arabic script too difficult? (see, e.g., Abdelhadi, Ibrahim & Eviatar, 2011)
- Attempt to moderate this difficulty with explicit instruction about the Arabic writing system


# Experiment 2

- Procedures identical to Experiment 1, **except**:
  - Prior to the word learning phase, learners presented with information about the Arabic script
  - Only the Orthography condition (n=8)
- Subjects were told that Arabic is written from right-to-left and not left-to-right like English and were shown examples with arrows pointing to the distinguishing letters

فبيل



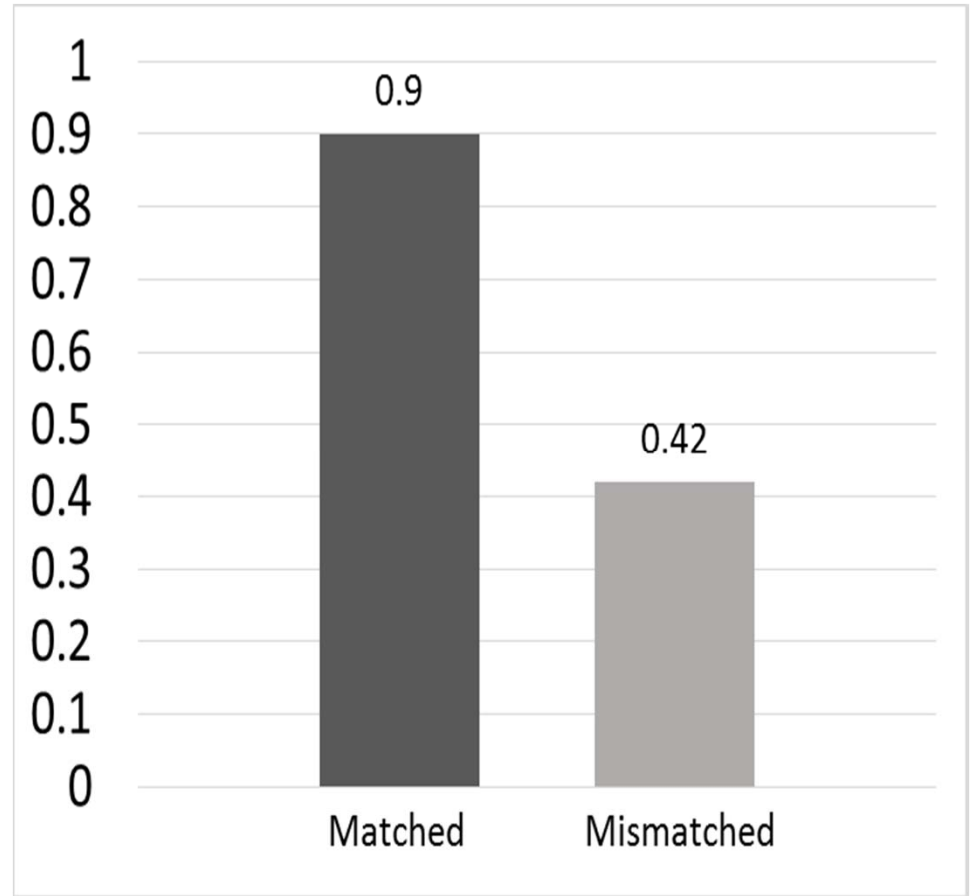
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## Experiment 2 Findings

- *Orthography condition only*
- Matched items: .90 (E1: .87)
- Mismatched items: .42 (E1: .47)



# Experiment 2 Conclusions

- Explicit instruction (of this type) does not appear to have been helpful
- Did instruction add too much new information for English speakers to interpret?
  - New orthography, new contrasts, and instructions to keep in memory

# Experiment 3

- Alleviate script difficulty by using Romanized Arabic script
- Procedures the same as Experiment 1, **except**:
  - Orthographic forms presented in the Roman alphabet (e.g., <kashu>, <qashu>)
  - But note novel grapheme-phoneme correspondence : <q>-/q/
  - Only the Orthography condition (n=8)



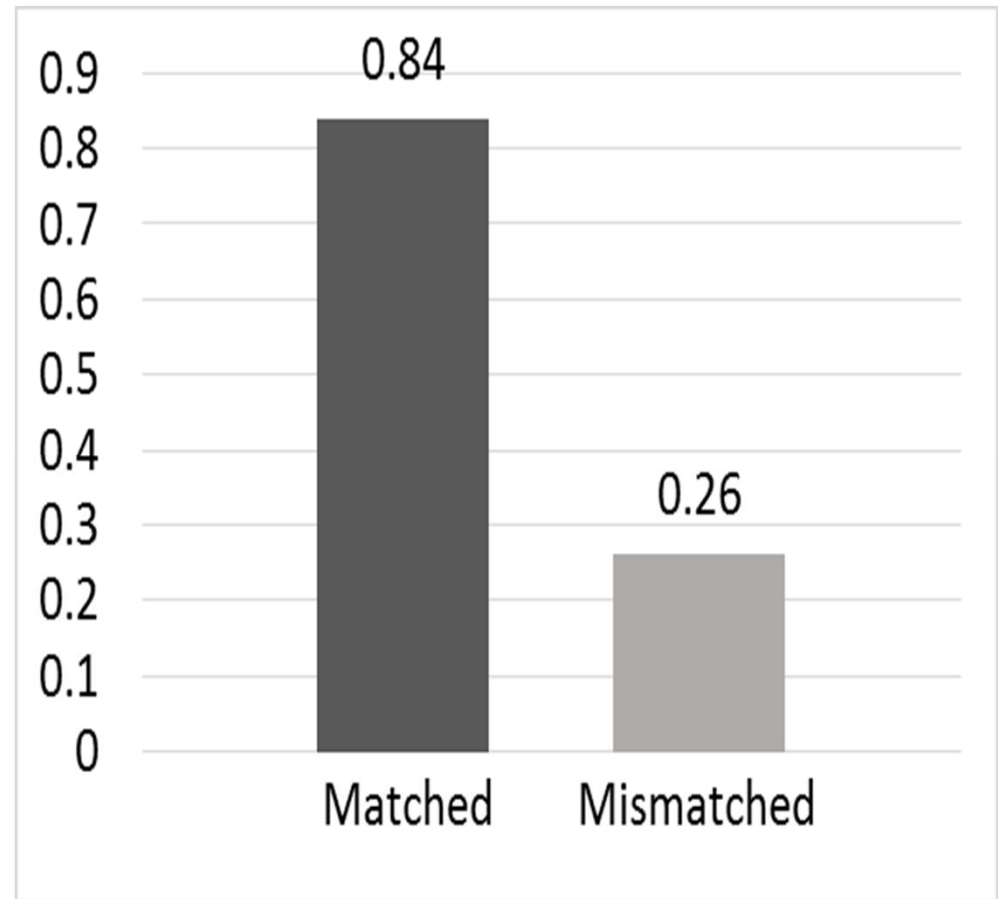
**kubu**



**qubu**

## Experiment 3 Findings

- *Orthography condition only*
- Matched items: .84  
(E1: .87, E2: .90)
- Mismatched items: .26  
(E1: .47, E2: .42)



# Experiment 3 Conclusions

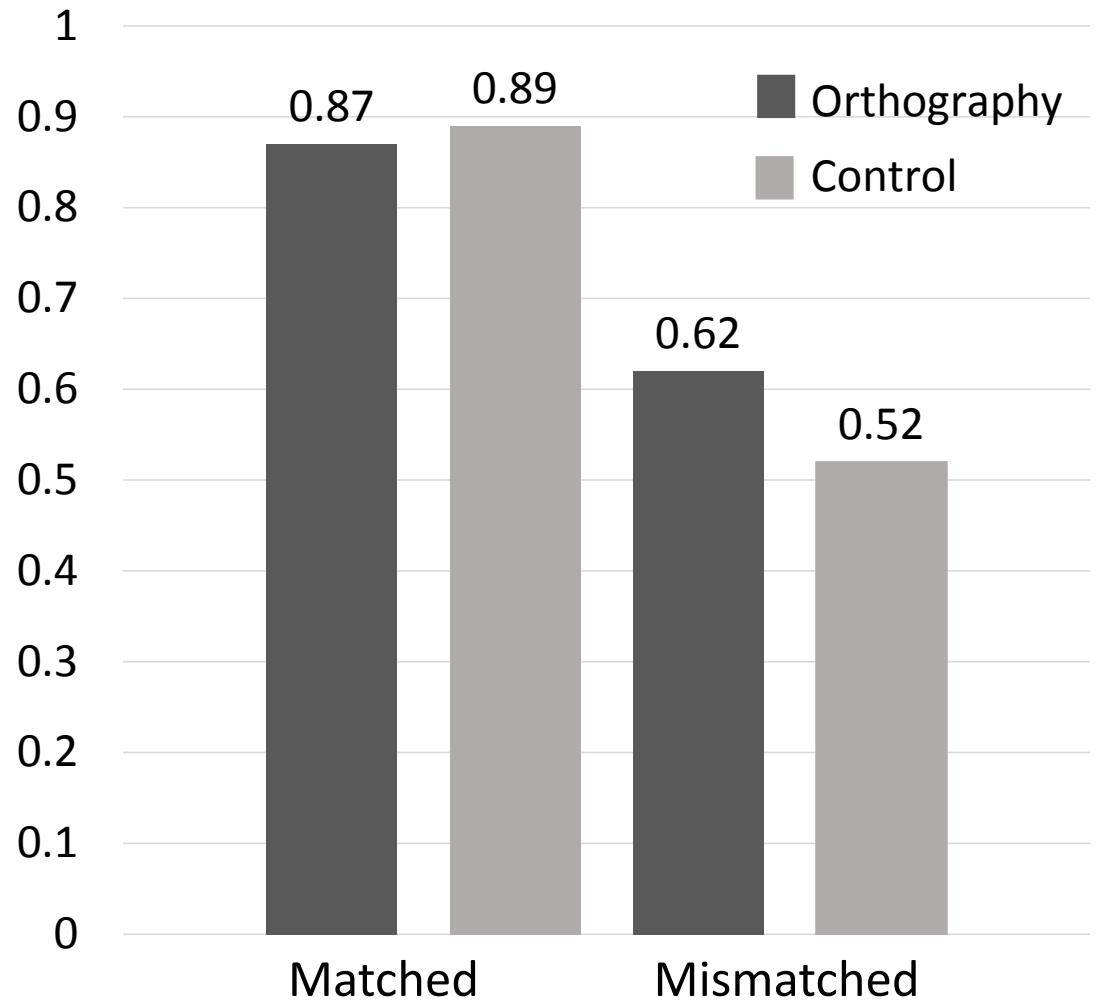
- Difficulty associating with the novel Arabic orthography did not fully explain native English speakers' performance in Experiment 1
  - *Less accurate performance in Experiment 3*
- The auditory/k-q/ contrast may be too difficult

# Experiment 4

- Alleviate auditory contrast difficulty by reducing the number of talkers to one
  - In pilot studies, word learning was enhanced by reducing number of talkers
- Procedures the same as Experiment 1, except:
  - Auditory stimuli produced by only one talker
  - Orthography condition (n=15)
  - Control condition (n=15)

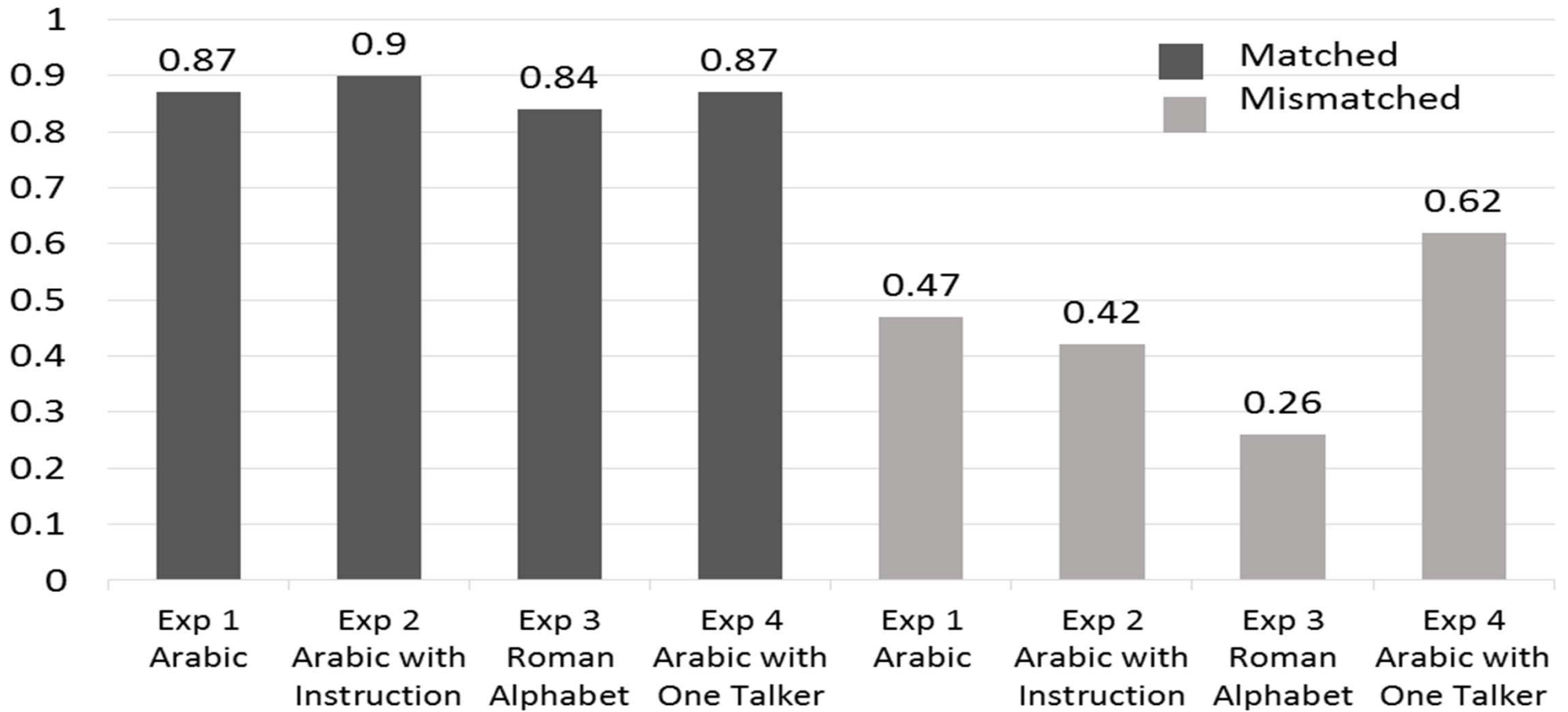
# Experiment 4 Findings

- *Orthography condition*
  - Matched items: .87
  - Mismatched items: .62  
(performance sig. above chance;  $p=.037$ )
- *Control condition*
  - Matched items: .89
  - Mismatched items: .52



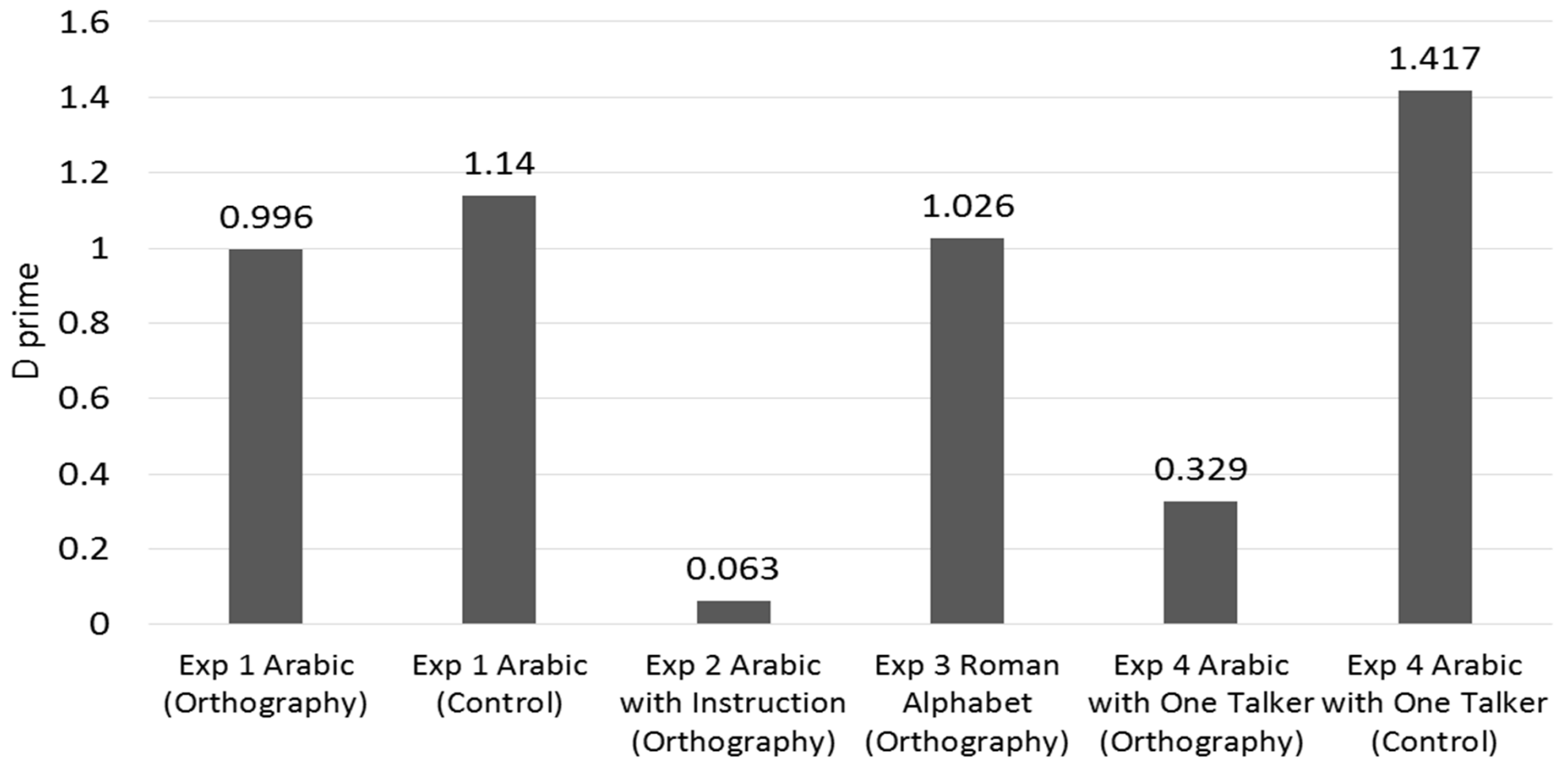
Showalter & Hayes-Harb, in prep

### Orthography Condition Proportion Correct





## D-prime values per experiment



# Conclusions

- Arabic script may be too difficult for learners to utilize
  - How is performance accuracy on Experiment 3 (Roman representations) explained?
- Is the /k/-/q/ contrast too difficult?
  - Even with the aid of orthographic representations?
  - Easier contrast?

## General Conclusions:

### Role of orthographic input in L2 word learning

- Orthographic information can be a powerful source of information about the phonological structure of L2 words
- Orthographic information may “override” auditory information when...
  - Auditory and orthographic information “conflict” (Hayes-Harb et al. 2010); and
  - Auditory information is unusable because learners cannot perceive the auditory contrast (Escudero et al. 2008)
- Orthographic input may cause learners to...
  - Misremember the phonological forms of newly-learned L2 words (Hayes-Harb et al. 2010); and
  - Create non-target-like phonological representations for L2 syllables (Bassetti 2006)

## General Conclusions:

### Influence of orthographic familiarity in moderating role of orthographic input

- Orthographic information can help learners to associate novel phonological contrasts with L2 words when...
  - The letters are familiar (Dutch/English; Escudero et al., 2008); and
  - When the orthographic forms involve unfamiliar symbols (English/Mandarin; Showalter & Hayes-Harb, 2013)
- However, orthographic information may not always be helpful to the acquisition of target-like L2 forms
- It may have no significant beneficial effect when...
  - The orthographic and/or auditory contrasts are too difficult for learners to perceive (Showalter 2012)
  - When a novel script is utilized--how do learners interpret a novel script?

## General Conclusions: Talker variability in novel word learning

- Both Showalter and Hayes-Harb (2013) and Showalter (2012) found that reduction in number of speakers aided performance
- Pilot studies indicate that L2 word form learning may be more difficult when input comes from multiple talkers
  - Note: contrary to benefits of talker variability attested in other domains of L2 phonological acquisition (e.g., work by Pisoni et al., Barcroft and Sommers 2005)

# Acknowledgments

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