Acquisition of Mandarin Tones: Does explicit information about the pitch changes help?

Helen Brown & Elizabeth Wonnacott

Mandarin Teaching in English Schools

- In September 2015, the Chancellor announced £10m of additional funding to support the teaching of Mandarin in English schools (*House of Commons. Briefing Paper: Number 07388*).

- Number of students studying Mandarin is growing
  - Number of schools offering Mandarin (*British Association for Chinese Studies*)
    - *2005:* 7-8% of state secondary schools
    - *2015:* 13% of state secondary schools, and 46% of independent schools
  - Between 2010 and 2016, the number of students entered for GCSE in Mandarin rose 41% (*British Council Survey Report*)

Tonal Languages

- Pitch changes can alter word meaning
- Up to 70% of the world's languages contain tonal information (Yip, 2002)
- In Mandarin Chinese each syllable carries a pitch
- Pitch differences are used to distinguish the meaning and grammatical function of Mandarin syllables (Chao, 1948)
  - Tone 1, high-level *mā (mother)*
  - Tone 2, high-rising *má (hemp)*
  - Tone 3, low-dipping *mǎ (horse)*
  - Tone 4, high-falling *mà (scold)*

Research Questions

- What is the best way to teach tonal information to children?
- Can children learn tonal information without any explicit teaching?
- Does explicit teaching improve learning?
  - Diacritics (Study 1)
  - Gestures (Study 2)

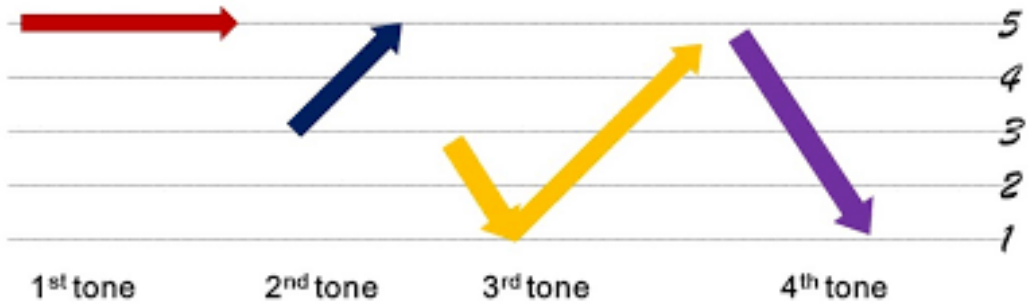
Participants

- 7-8 year olds (Year 3)
  - Pictures only, N = 26
  - Pictures with diacritics, N = 25
  - Pictures with gestures, N = 20

- No prior knowledge of Mandarin *or* any other tonal language

Study 1: Diacritics

- Diacritic = shape depicts the pitch contour

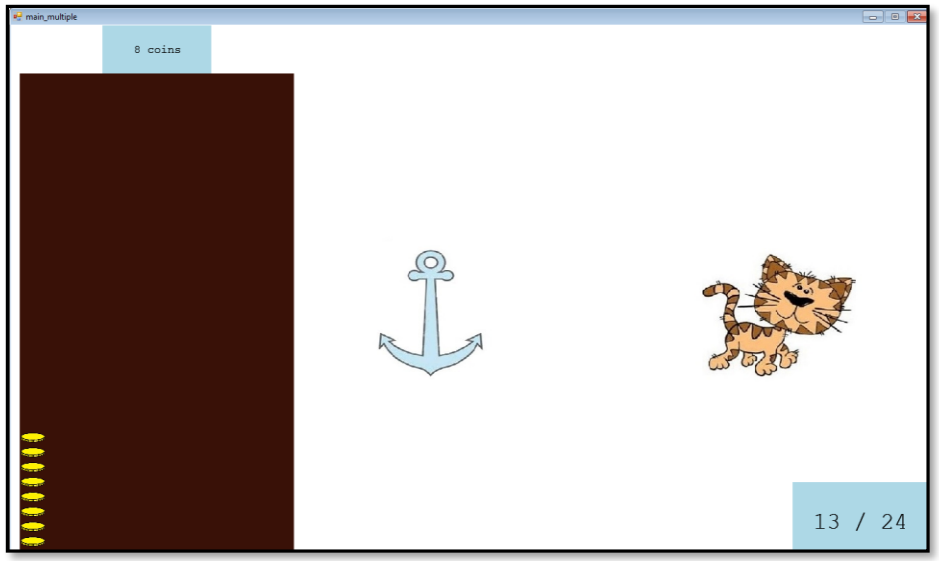


- Liu et al. (2011)
  - Adult participants
  - Compared recognition of tones with diacritics *versus* numbers (1-4)
  - Tone recognition improved more in the diacritics condition
  - But, adults did not have to learn the meanings of the words, only recognise the tones

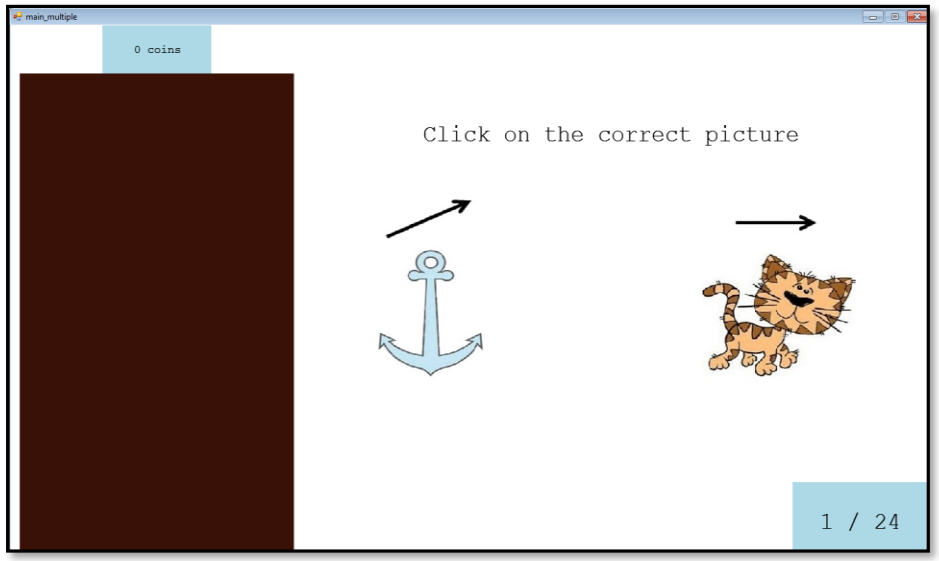
Study 1: Diacritics

Children learned 12 Mandarin words (6 pairs) using a computerised vocabulary training program

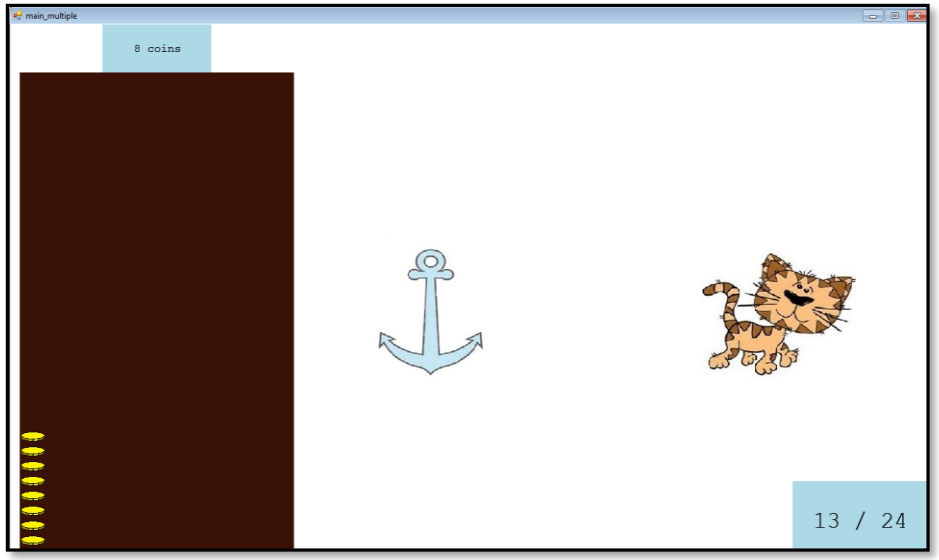
Pictures Only

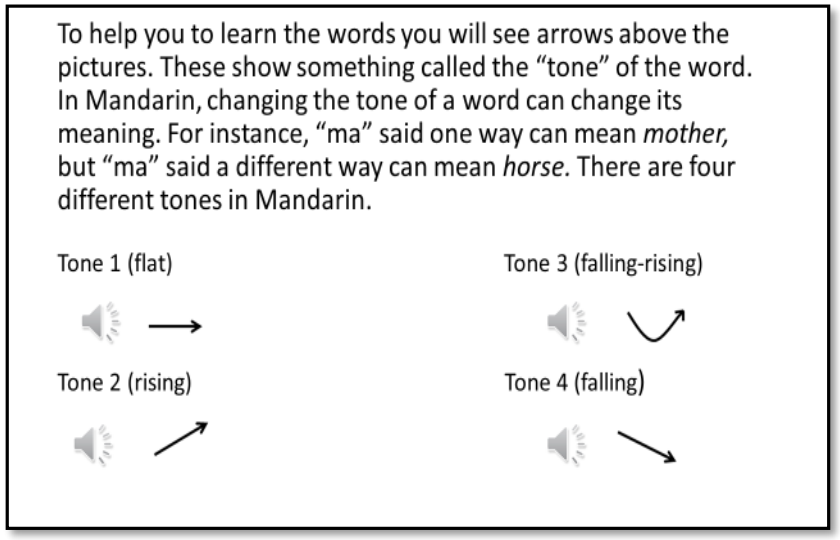


Picture with Diacritics

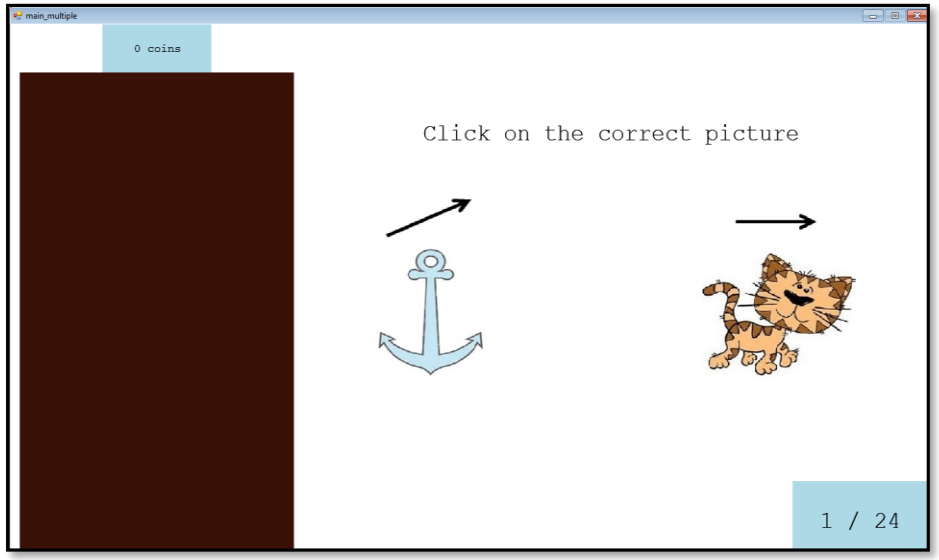


Pictures Only

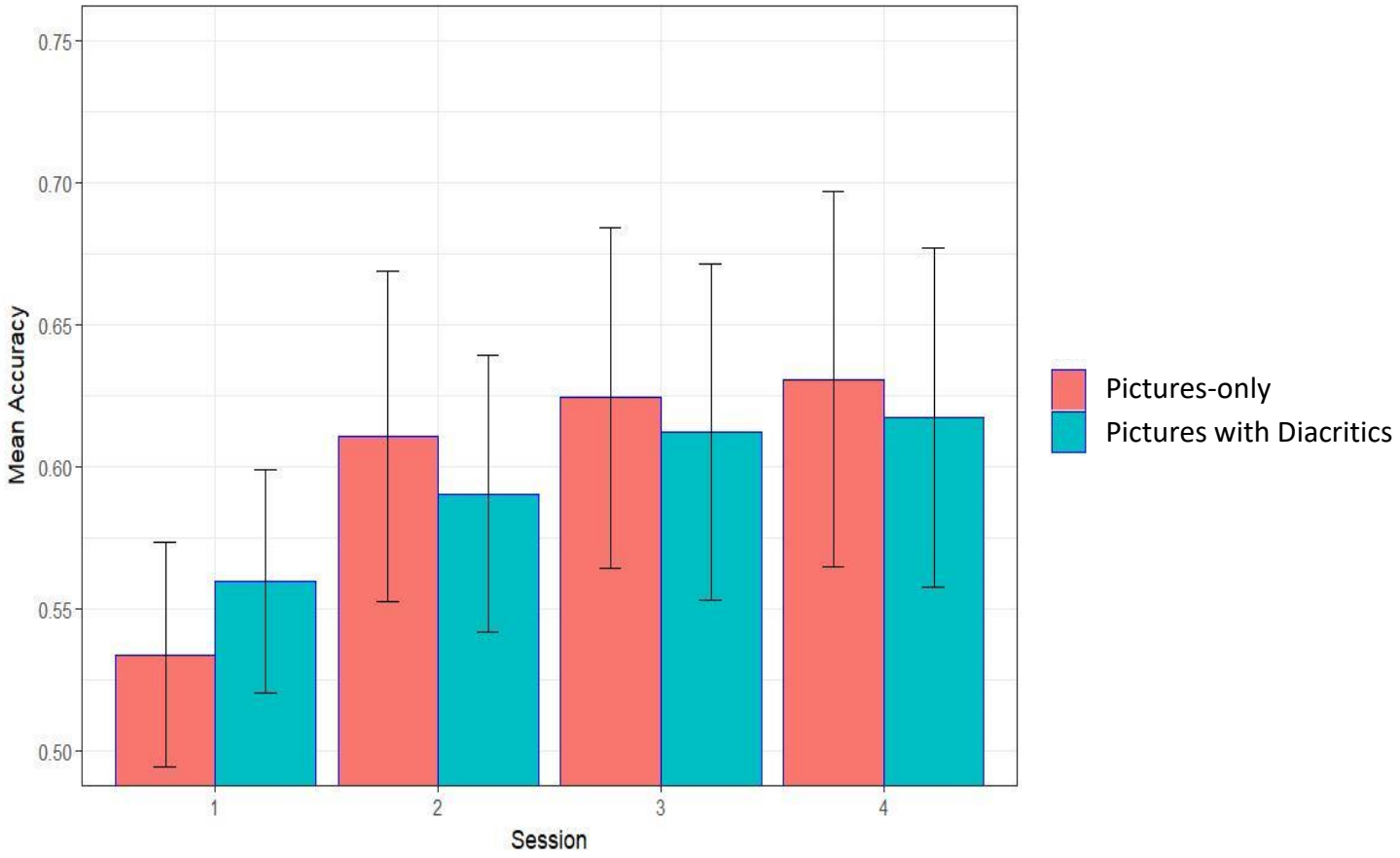




Picture with Diacritics



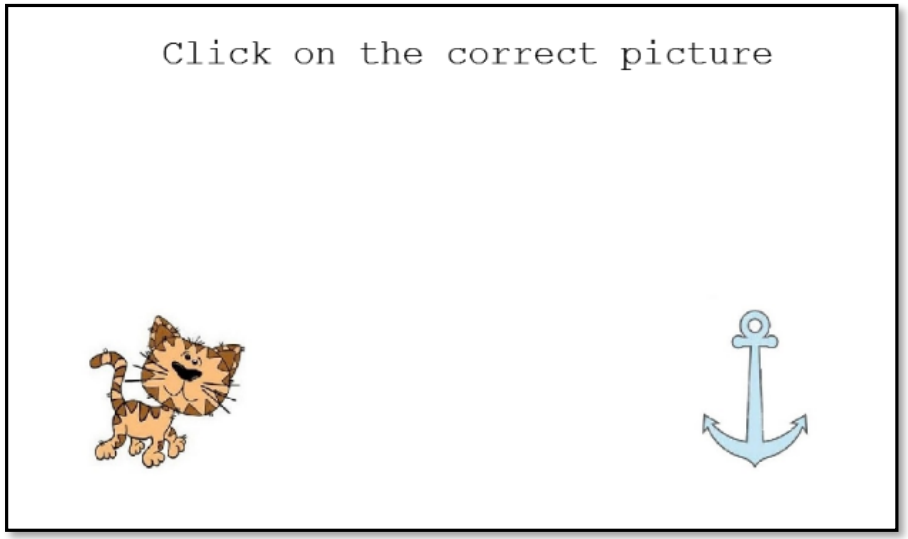
How well did children learn the words?



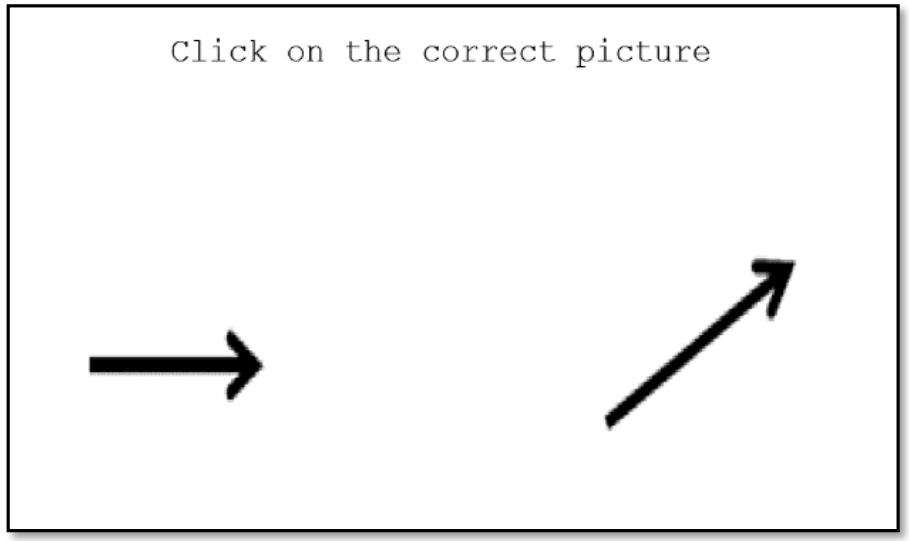
- Both groups improve between Sessions 1 and 4
- No difference in the amount of improvement between the two groups
- Suggests that having diacritics presented alongside pictures does not increase vocabulary learning

How well did children learn the words?

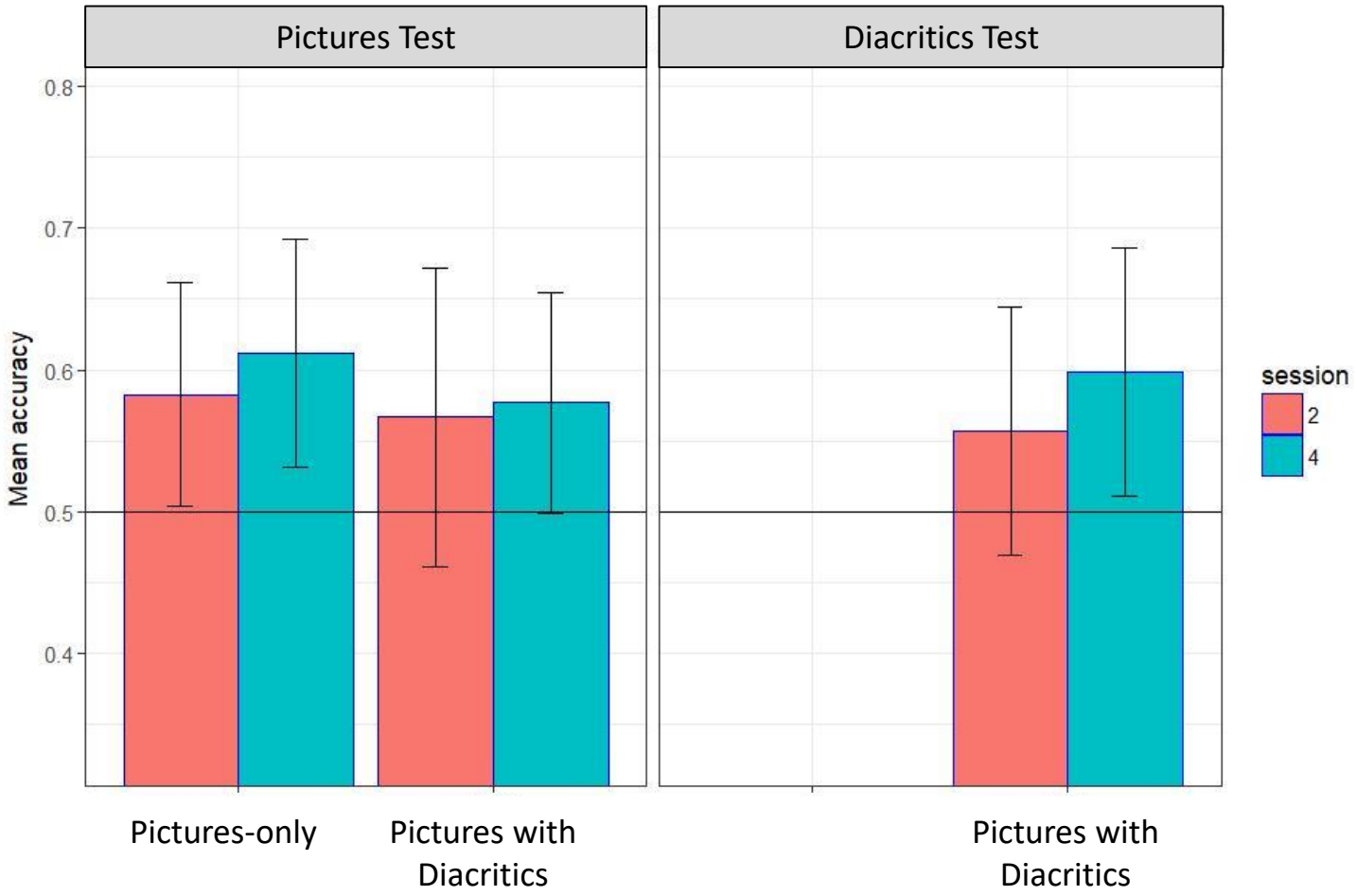
Pictures Test



Diacritics Test



How well did children learn the words?



- **Pictures Test:** No difference between groups, suggesting that diacritics do not improve (or hinder) vocabulary learning
- **Diacritics Test:** Children in the pictures and diacritics condition could accurately match words with the diacritics

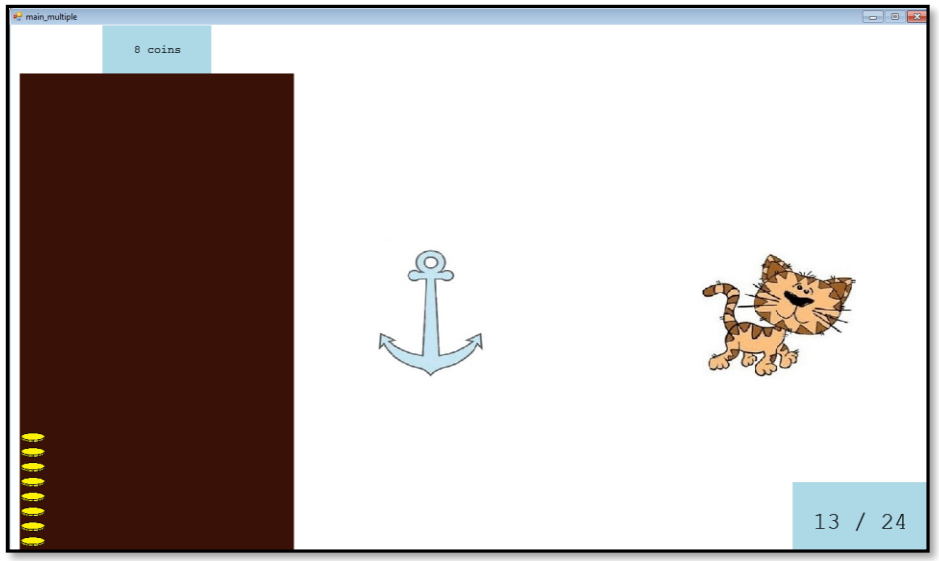
Study 2: Gestures

- Some studies suggest that iconic gestures can benefit vocabulary learning in a second language (Kelly, McDevitt, & Esch, 2009)
- But only when the first and second language words sound similar (Kelly & Lee, 2012)
- When the first and second language words were phonetically dissimilar, iconic gestures hindered learning (Kelly & Lee, 2012)
- In Mandarin, gestures representing pitch contours of tones aided vocabulary learning in adults (Morett and Chang, 2015)

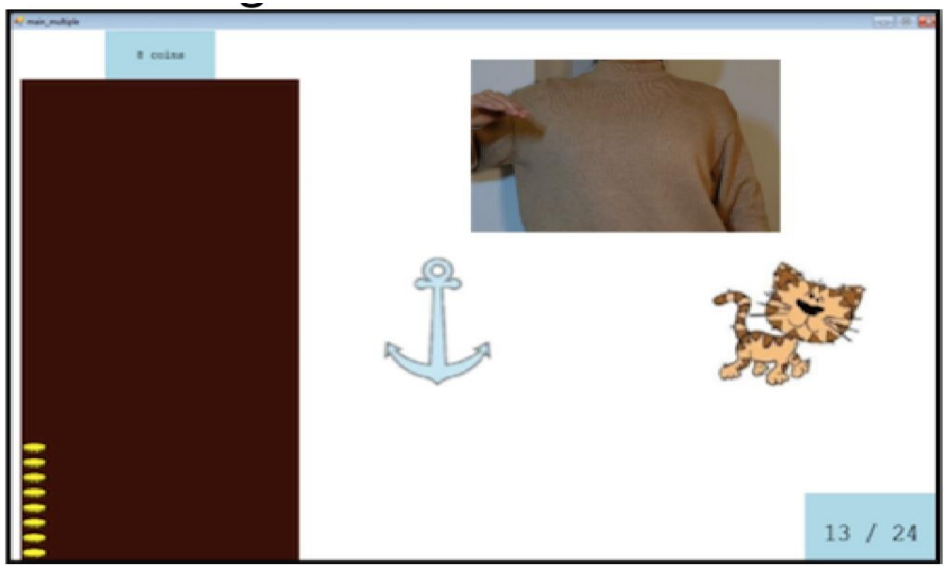
Study 2: Gestures

Children learned 12 Mandarin words (6 pairs) using a computerised vocabulary training program

Pictures Only



Picture with Gestures



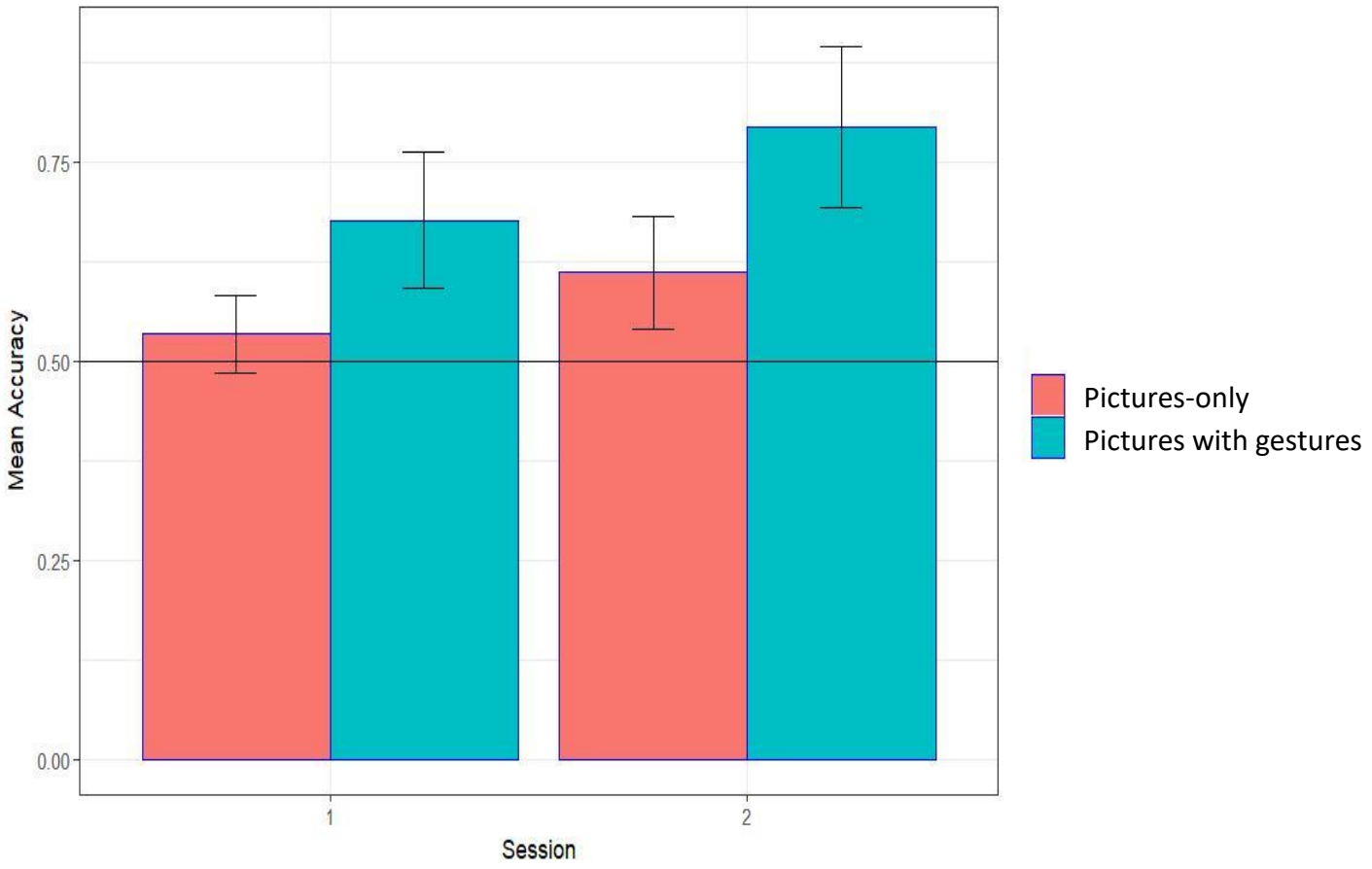
Tone 1 (flat)

Tone 2 (rising)

Tone 3 (dipping)

Tone 4 (falling)

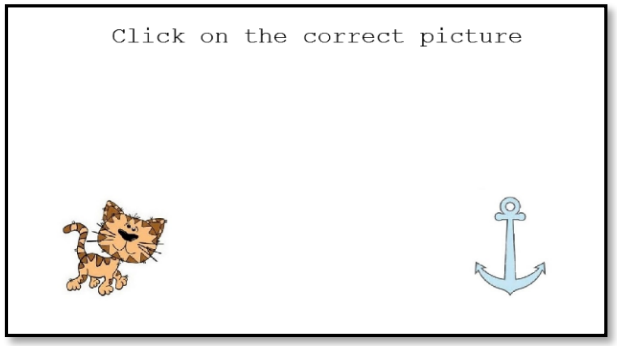
How well did children learn the words?



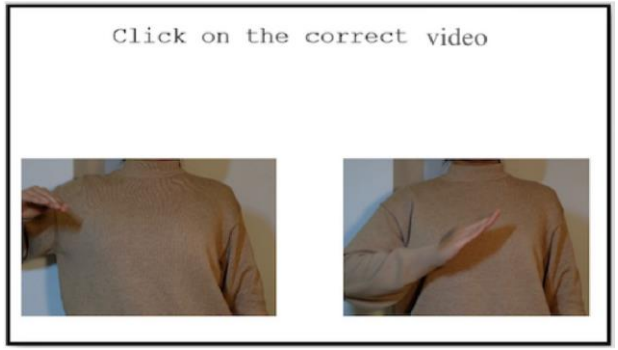
- Overall, accuracy was *higher* in the gesture group than in the pictures-only group
- The gesture group showed *greater improvement* between session than the pictures-only group
- Suggests that gestures benefit vocabulary acquisition

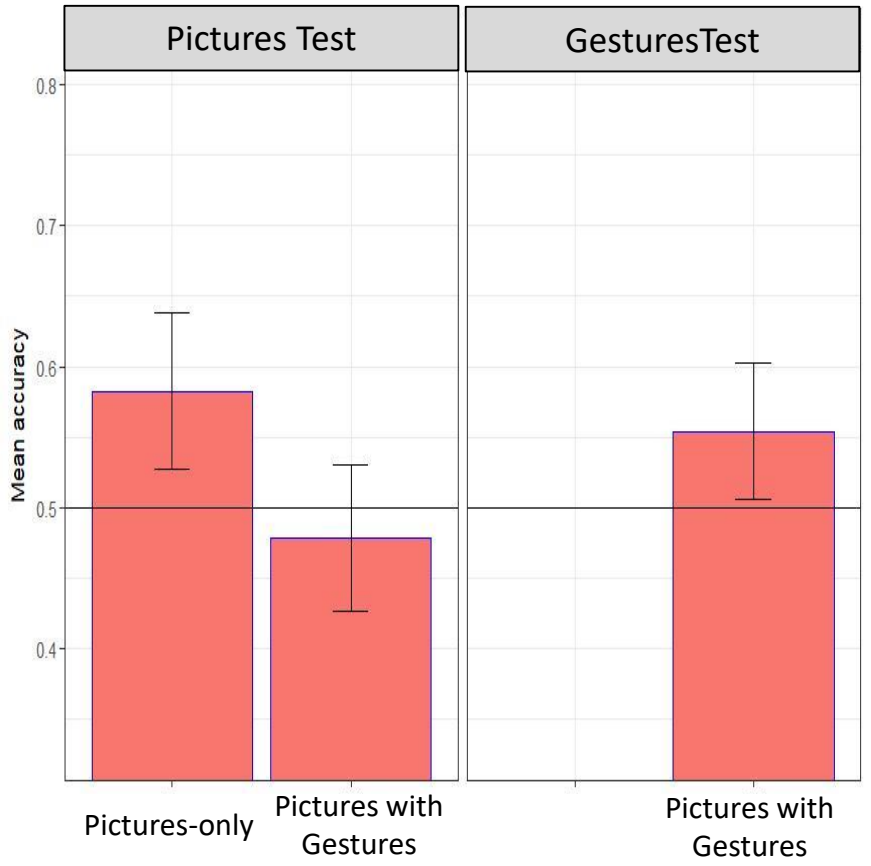
How well did children learn the words?

Pictures Test



Gestures Test





- **Pictures Test:** Higher performance in pictures-only condition, suggesting greater retention of trained word-meaning mappings in this group
- **Gestures Test:** Children in the pictures and gestures condition could accurately match words with the gestures

Conclusion

- Children can learn to associate different tones with different meanings with *no* explicit instruction
- Adding diacritics to the training task did not improve learning
- Adding gestures to the training task increased accuracy in that task, **but** once the gestures were removed children were less successfully at remembering the new word-picture mappings

References

Kelly, S. D., & Lee, A. L. (2012). When actions speak too much louder than words: Hand gestures disrupt word learning when phonetic demands are high. *Language and Cognitive Processes, 27*, 793-807.

Kelly, S. D., McDevitt, T., & Esch, M. (2009). Brief training with co-speech gesture lends a hand to word learning in a foreign language. *Language and cognitive processes, 24*, 313-334

Liu, Y., Wang, M., Perfetti, C. A., Brubaker, B., Wu, S., & MacWhinney, B. (2011). Learning a tonal language by attending to the tone: An in vivo experiment. *Language Learning, 61,* 1119-1141.

Morett, L. M., & Chang, L. Y. (2015). Emphasising sound and meaning: Pitch gestures enhance Mandarin lexical tone acquisition. *Language, Cognition and Neuroscience, 30*, 347-353.

Yip, Moira (2002). *Tone*. Cambridge Textbooks in Linguistics. Cambridge: Cambridge University Press