ASSESSMENT OF SPEECH PERCEPTION: CROSS-LINGUISTIC CONSIDERATIONS

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THE HINT EXPERIENCE

CURRENTLY IN AT LEAST 20 LANGUAGES

- American English
- Brazilian Portuguese
- Bulgarian
- Canadian French
- Cantonese
- Castilian Spanish
- Japanese
- Korean
- Mainland Mandarin
- Malay
- Norwegian
- South American Spanish
- Taiwan Mandarin
- Turish

HEARING IN NOISE TEST (HINT)

- Ability to understand sentences in quiet and noise
- 12 lists of 20 sentences each
- In American English
- Sentence reception thresholds (SRTs) are obtained
  - In quiet - dB A at which 50% of sentences are repeated
  - In noise - dB S/N at which 50% of sentences are repeated
- Adaptive presentation method

DEVELOPMENT OF THE HINT

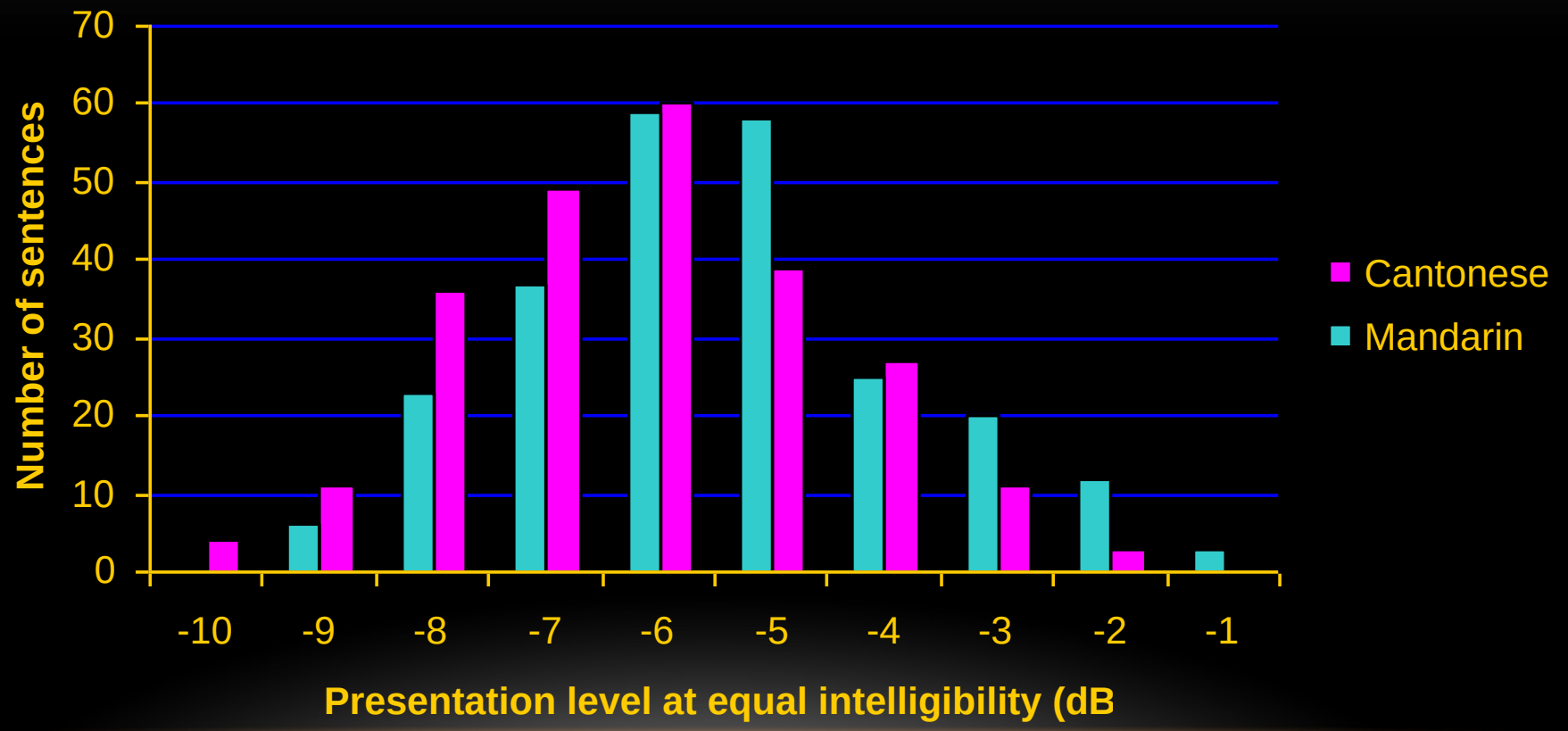
- American English HINT
- No standardized Cantonese materials

- 4-7 syllables in English (e.g., The dog is chasing the cat)
- We attempted to identify individual sentences that yield about the same performance-intensity (PI) function slopes
- Results: PI function slopes that ranged from 10-33% per dB change in S/N

EQUALIZATION OF DIFFICULTY

- Outcomes: lengthened the sentences to 10 characters/syllables each by adding adverbial clauses to yield 10% per dB change in S/N
  - Number of syllables varied across languages (Soli & Wong, 2008)
  - Longer sentences may be a problem in elderly listeners with reduced working memory
- Because the sentence yielded 50% intelligibility at different levels, we had to scale so that they yield 50% intelligibility at about the same level.

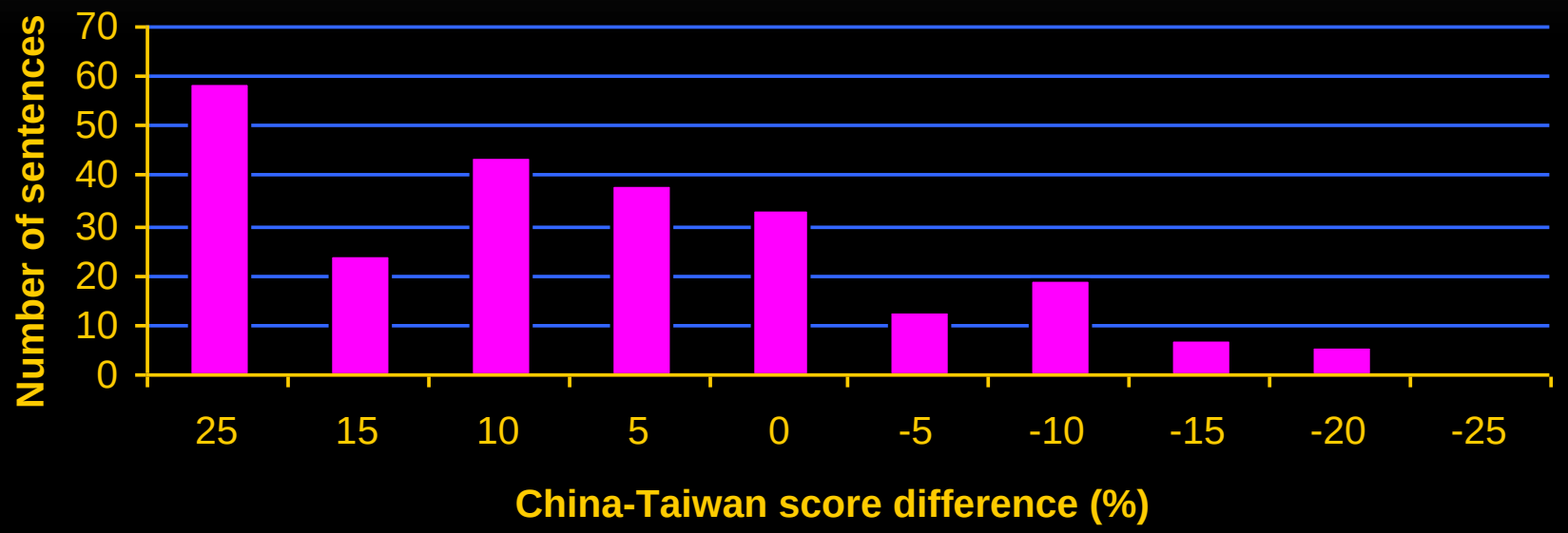
SCALING FACTORS



DEVELOPMENT OF THE TAIWAN MANDARIN HINT

- Created sentences by avoiding vocabulary/lexicons that are not common between the cultures
- The sentences were judeged by native speakers for appropriateness and modified to ensure that they suit both cultures
- The sentences were recorded by a news reporter from mainland China with accent acceptable to Taiwanese people
- Sentences were tested to evaluate whether the same scaling factors could be applied and if not, whether there was a consistent difference between cultures

SCORE DIFFERENCE BETWEEN CHINA & TAIWAN



The Taiwanese subjects were annoyed by the accent of our speaker!

APPLICATION OF THE HINT IN DIFFERENT CULTURES

- Vocabulary/lexicon common in each culture
- Controlling the PI function slope at about 10% per dB change in S/N (Soli & Wong, 2008)
- Ensure that the same scaling factors could be applied across cultures
- Speaker with appropriate accent
- South American Spanish

THE HINT IN EVALUATING SECOND LANGUAGE LEARNERS

THE HONG KONG POPULATION

- Immigrants from mainland China
- Bilingual population from overseas (returning Chinese population from Canada, businessmen, South Asian immigrants from Pakistan, India)
- Every child in Hong Kong is learning English as a foreign language
- Normative data collected on monolingual speakers
- How do we distinguish developmental issues and cognitive declines from speech perception problems related to a hearing impairment when a second language is invovled?

PERCEPTION OF A SECOND LANGUAGE (L2)

Compared to native speakers, speakers of English as a second language (ESL) (Wu, 2014; Mayo et al., 1997; Takata et al., 1990; Florentine, 1985; Nábělek et al., 1984)

- Difficulties perceiving segmental cues
- More difficulties with L2 particularly in noise and reverberation
- Not as good in top down processing or utilization of linguistic information in speech understanding

BILINGUALS SCORE POORER THAN MONOLINGUALS IN NOISE

- Require more time to access the lexicon
- Phonetic interference from L1 (Mayo et al., 1997; Grosjean, 1989)
- More difficulties with categorical perception of voice onset time (VOT) in L2; experience with VOT modified as early as first year of life (Eilers et al., 1981)

- Simultaneous bilinguals perform as well as monolinguals

MOST RESEARCH DONE IN USA WITH ENGLISH AS A SECOND LANGUAGE (L2) AND SPANISH AS FIRST LANGUAGE (L1)

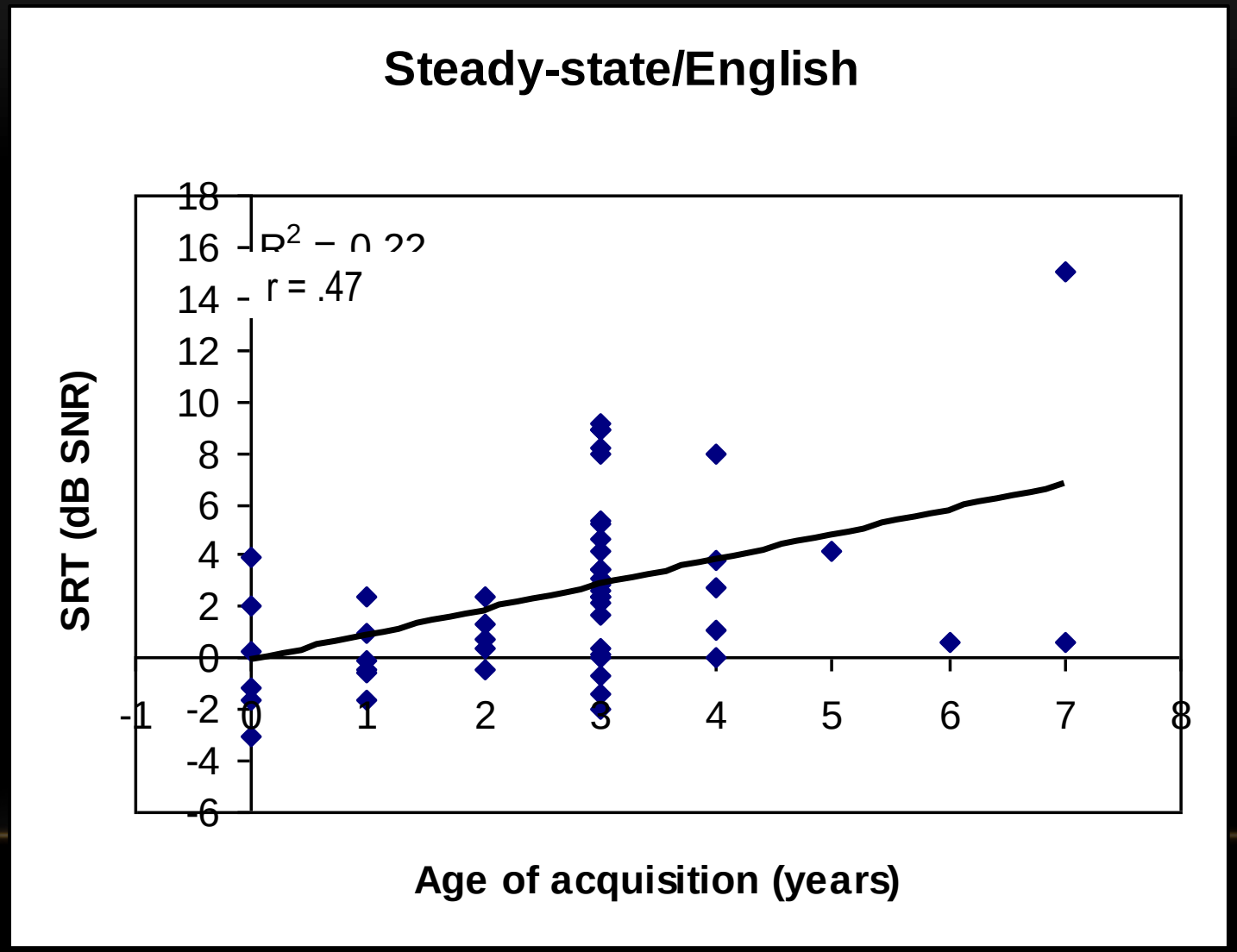
Characteristics	English as a second language (ESL)	English as a foreign language (EFL)
Populations	Immigrants	Students
Environment	Native English	Non-native English
English input	Extensive, native	Small amount, accented
Teaching & Learning focus	Conversational experience	Semantic information

STUDY I:
FACTORS AFFECTING EFL PERCEPTION

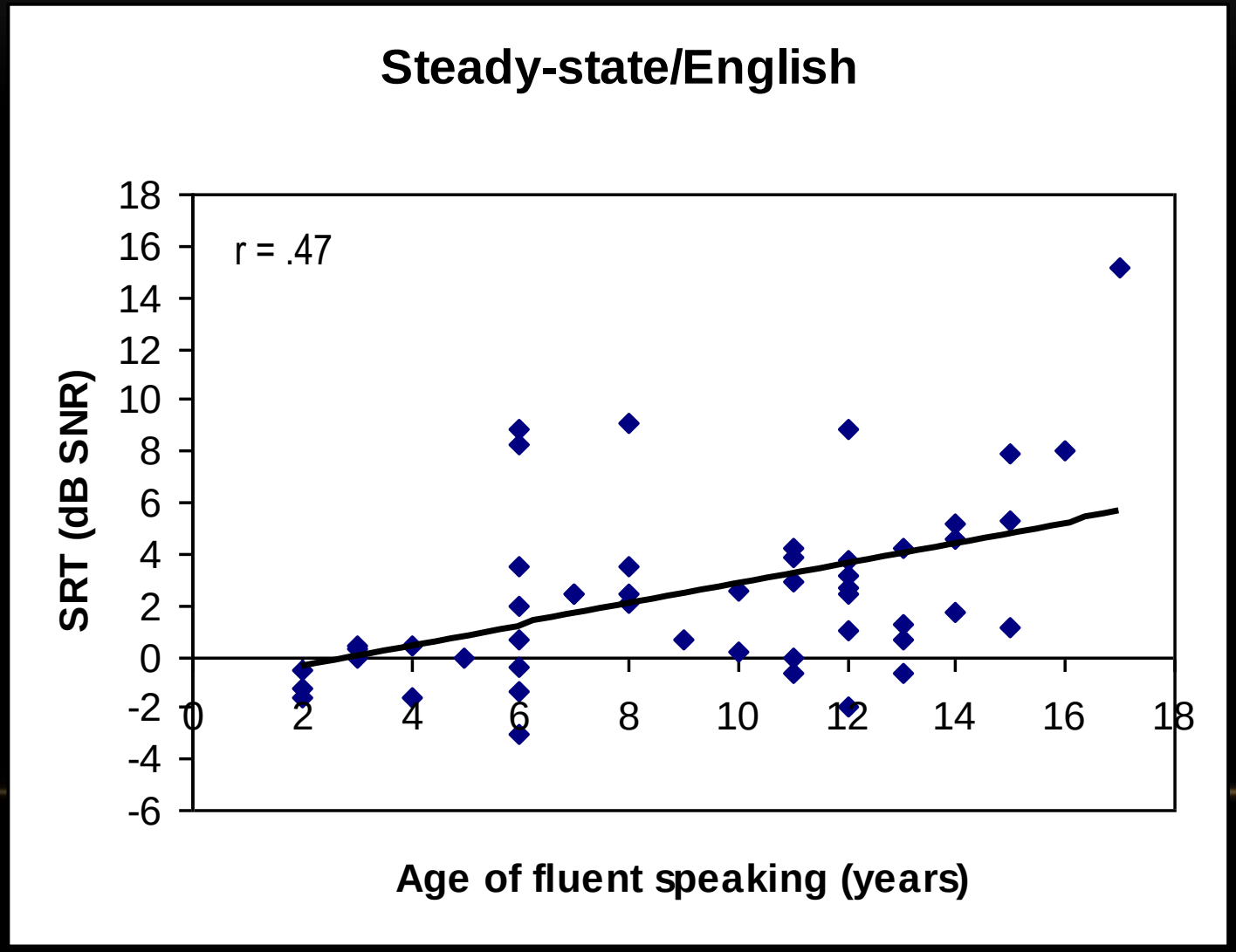
PARTICIPANTS

- 50 normal-hearing listeners 16 to 20 y.o.
- L1 was Cantonese and L2 was English.
- 25 from international schools; 25 from local schools.
- 17 acquired L2 before age 3; 33 later.
- 3 bilingual groups as age of fluent speaking:
  - 9 Early childhood bilingual (EB): < age 6
  - 36 Childhood to Puberty Bilingual (CPB): age 6 to 14
  - 5 After Puberty Bilingual (APB): > age 14.

AGE OF ESL ACQUISITION VS. SRT



AGE FLUENT L2 SPEAKING ACHIEVED VS. SRT IN ENGLISH



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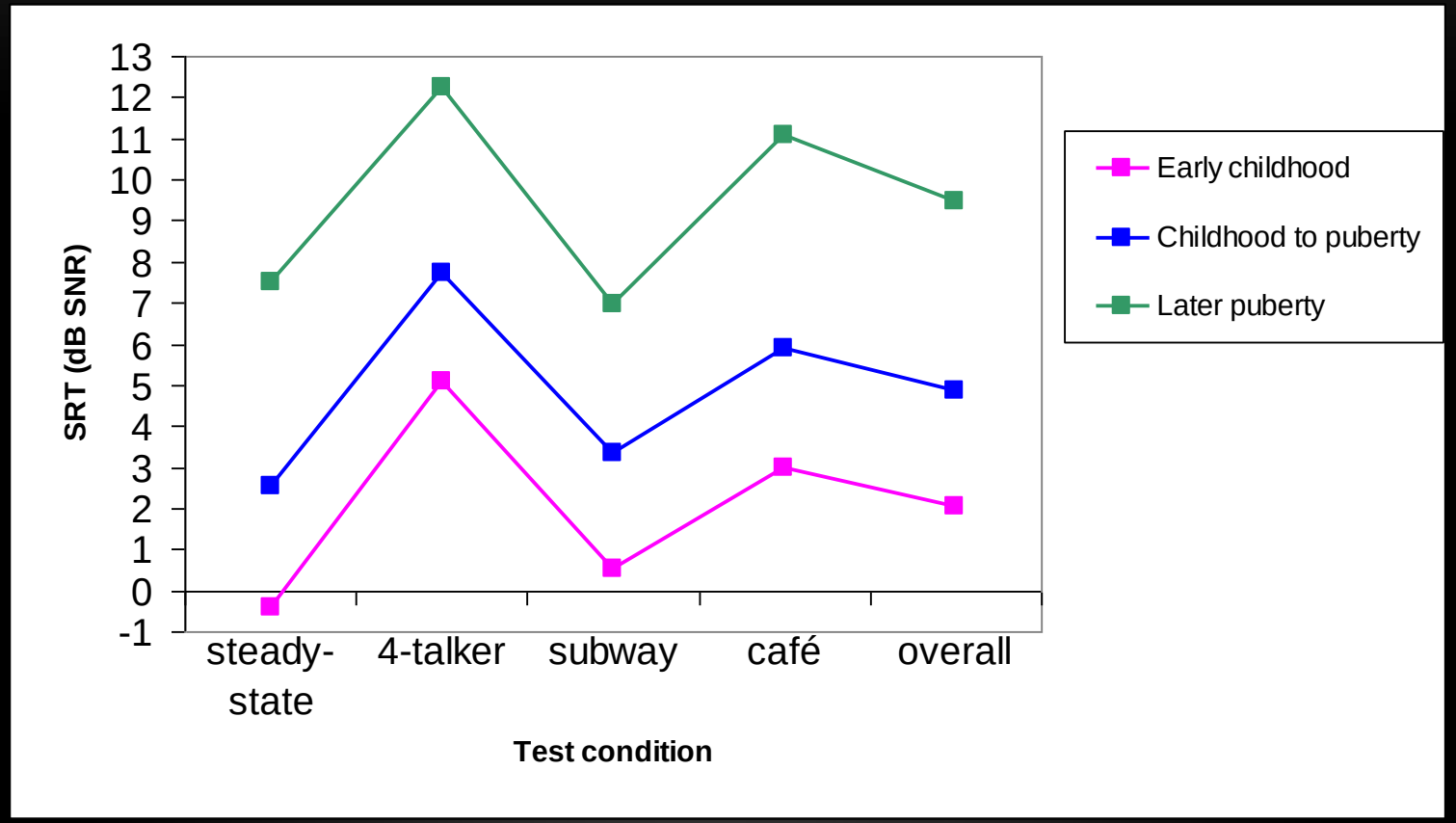
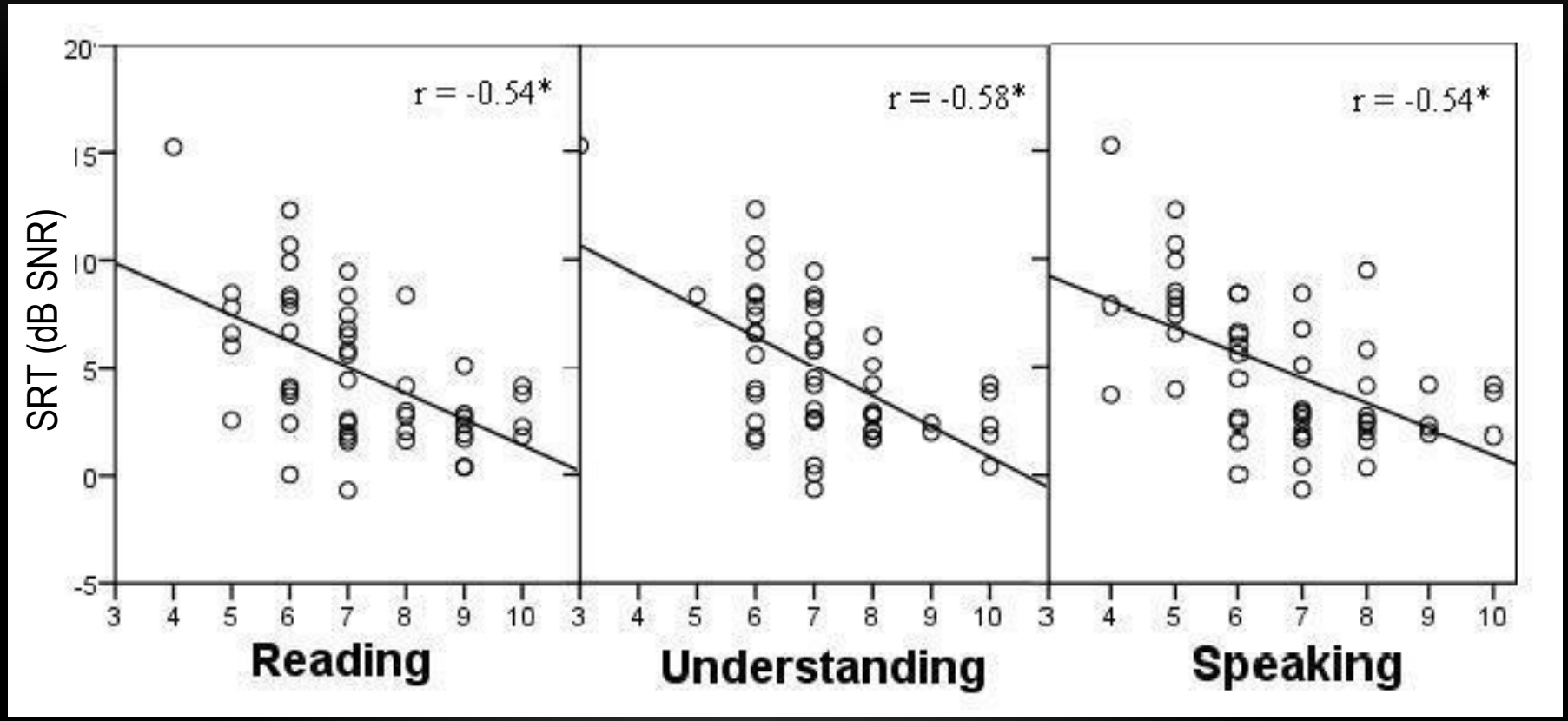
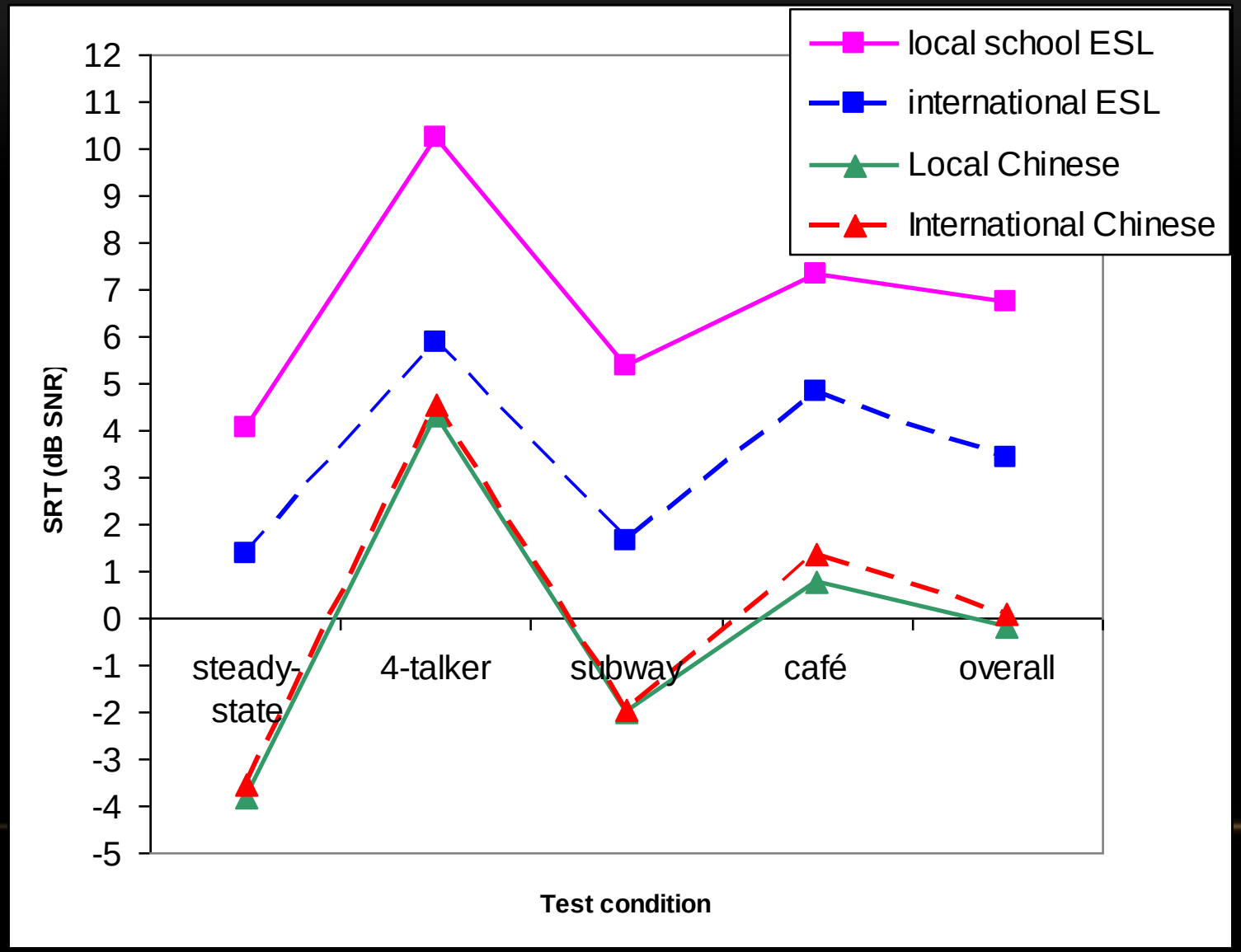


SELF-REPROTED PROFICIENCY VS SRT



SCHOOLING EXPERIENCE



FACTORS RELATED TO BETTER SRT IN EFL

- Early age when ESL/EFL was first learned (Bergman, 1980; Buus, Florentine, Scharf, & Canevet, 1986; Mayo, Florentine, & Buus, 1997; Takata & Nabelek, 1990).
- Early age when EFL was first spoken fluently
- Self-rated language proficiency in speaking, understanding and reading (Marian et al., 2007; van Wijngaarden et al., 2002)
- Greater exposure to native English in education (Flege and Liu's, 2001; Piske, 2007).

- Self-reported age of acquisition data may not be v accurate.

STUDY II: SPEECH PERCEPTION IN PROFICIENT EFL SPEAKERS

PARTICIPANTS

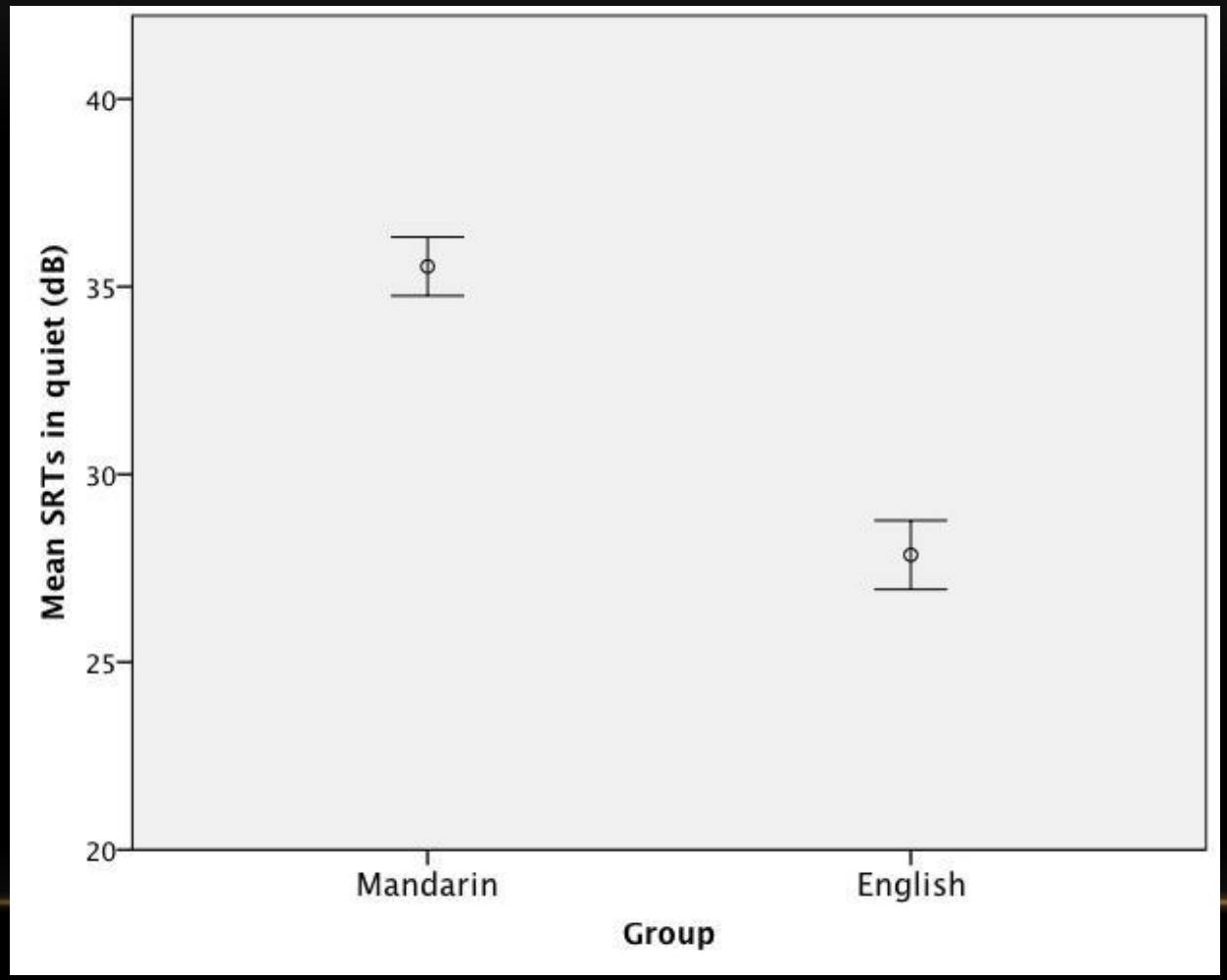
Mainland Chinese students

- 60
  Chinese as L1
  EFL learners.
- from the universities in Hong Kong.
  outstanding in academic performance and English proficiency.

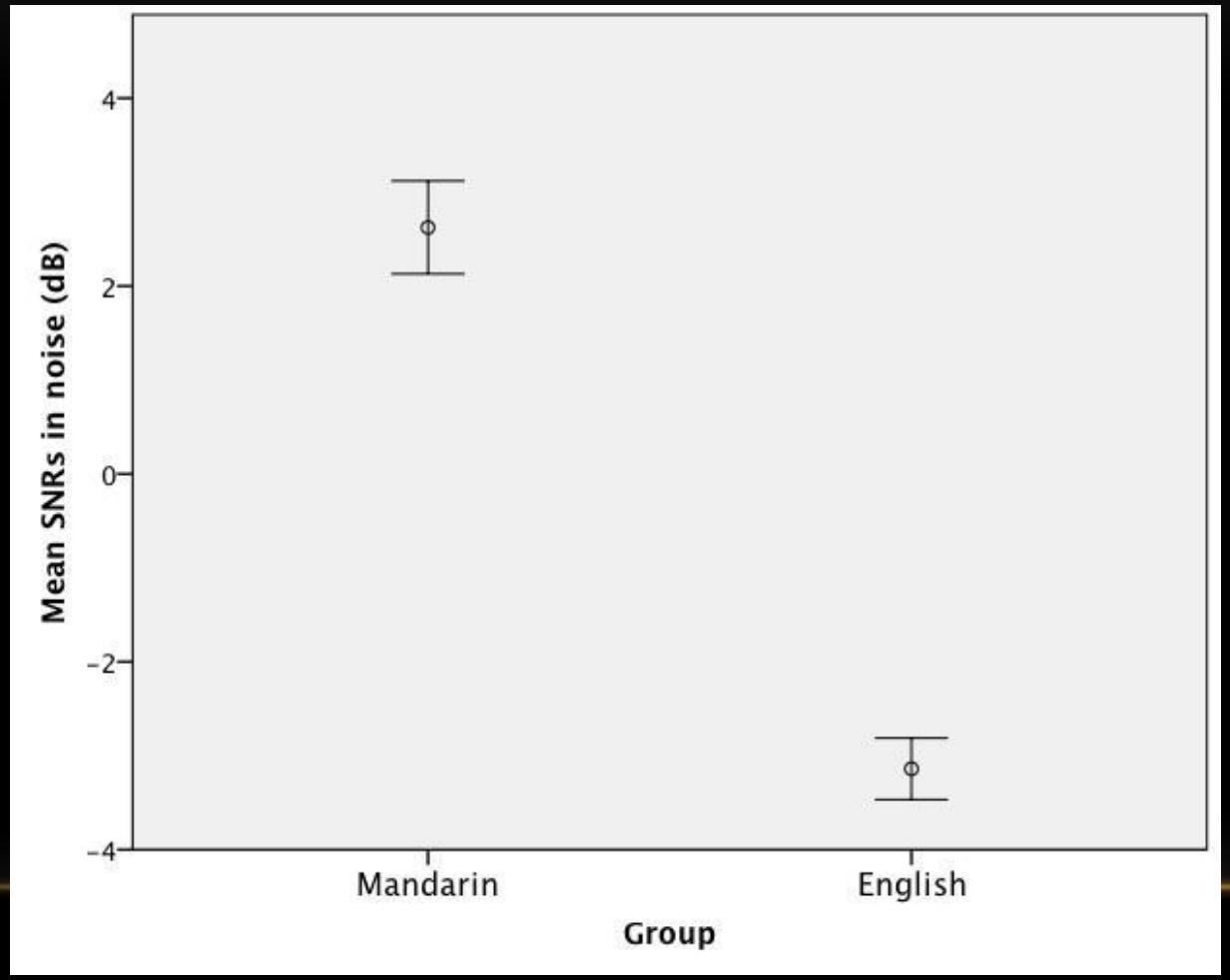
Native American English speakers.

- 20
  Control group

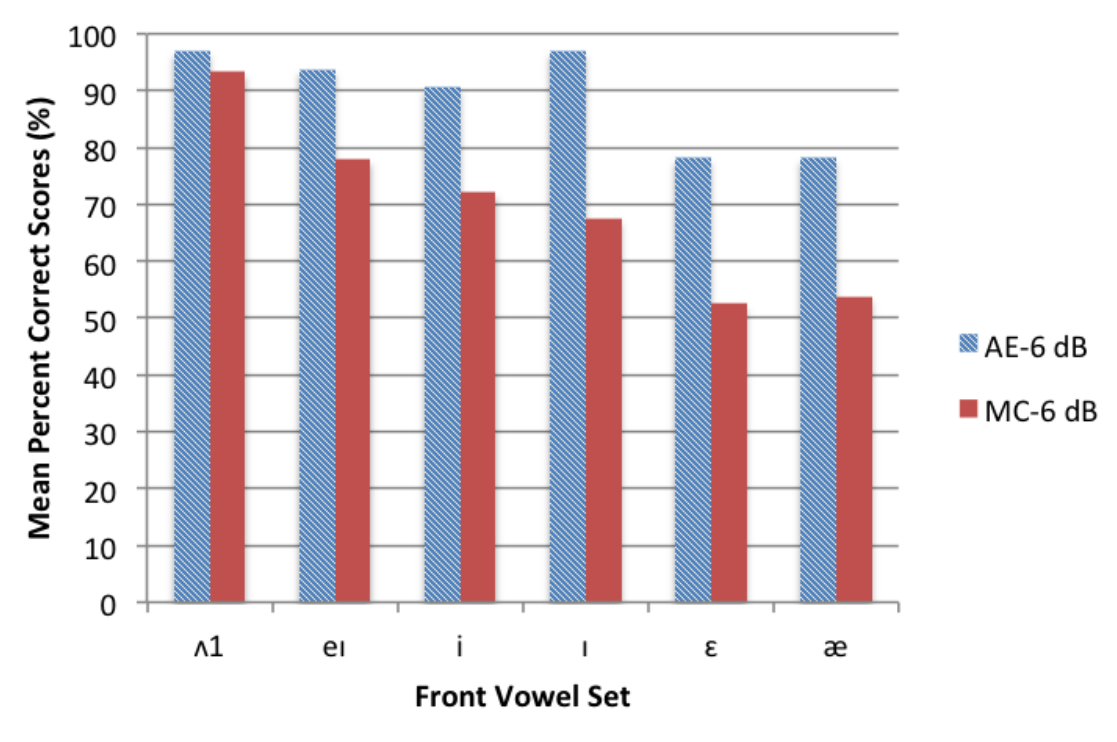
SENTENCE RECOGNITION IN QUIET BY EFL SPEAKERS



SENTENCE RECOGNITION IN NOISE BY EFL SPEAKERS



VOWEL IDENTIFICATION

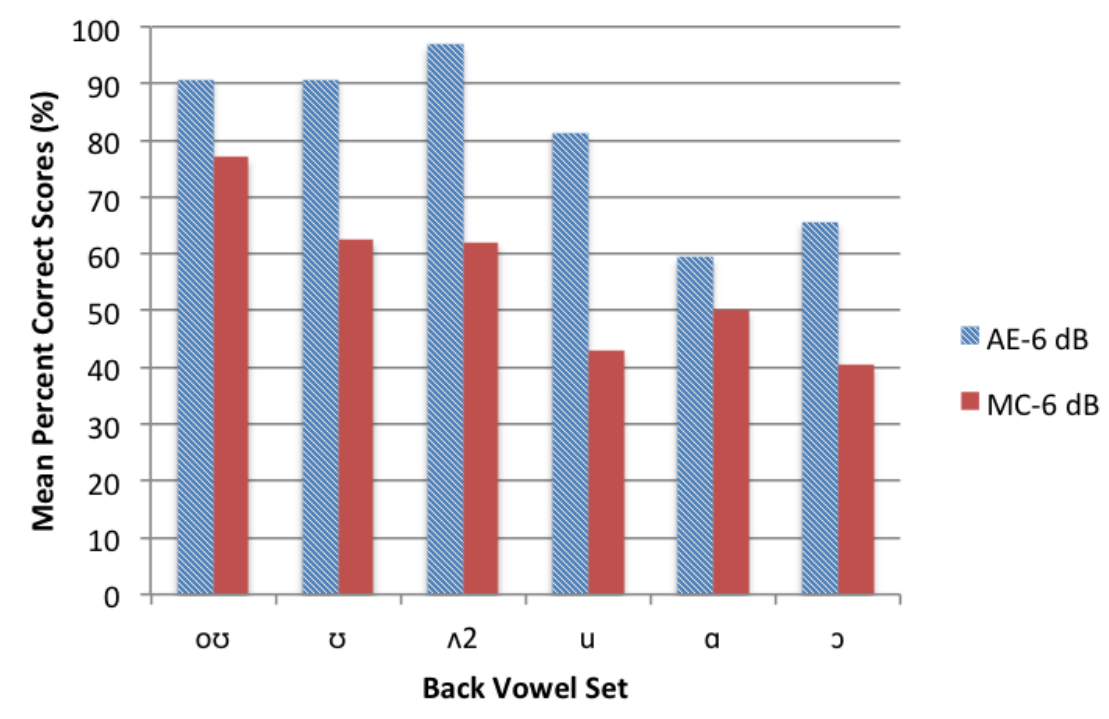


Mean percent correct scores of vowels in the front vowel set in the -6 dB S/N condition among the Mandarin speakers (MC) and English speakers (AE).

The vowel /ʌ/ was best perceived (ps < .01).

The vowels /æ/ and /ɛ/ were significantly poorly identified than the other vowels (ps < .01).

VOWEL IDENTIFICATION



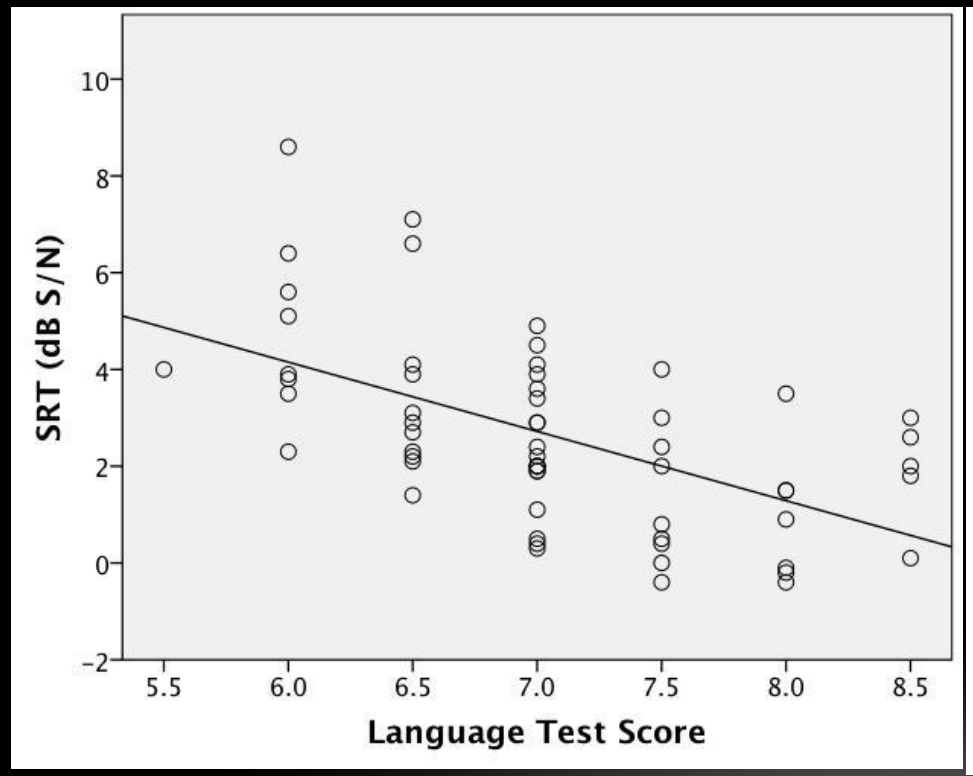
Mean percent correct scores of vowels in the back vowel set in the -6 dB S/N condition among the Mandarin speakers (MC) and English speakers (AE).

The vowel /oʊ/ was significantly better perceived than the vowels /ɑ/, /ɔ/ and /u/ (ps < .001);

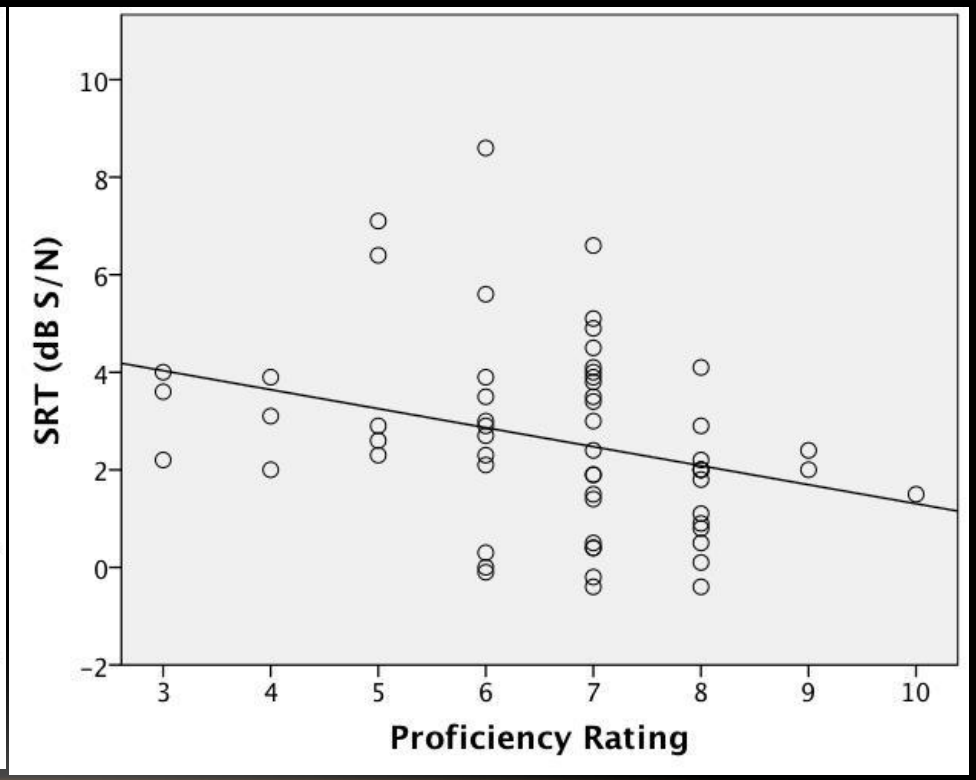
The vowel /ɔ/ yielded significantly lower scores than the vowels /oʊ/, /ʊ/ and /ʌ/ (ps < .01).

SRT AND PROFICIENCY IN LISTENING

r = -.53



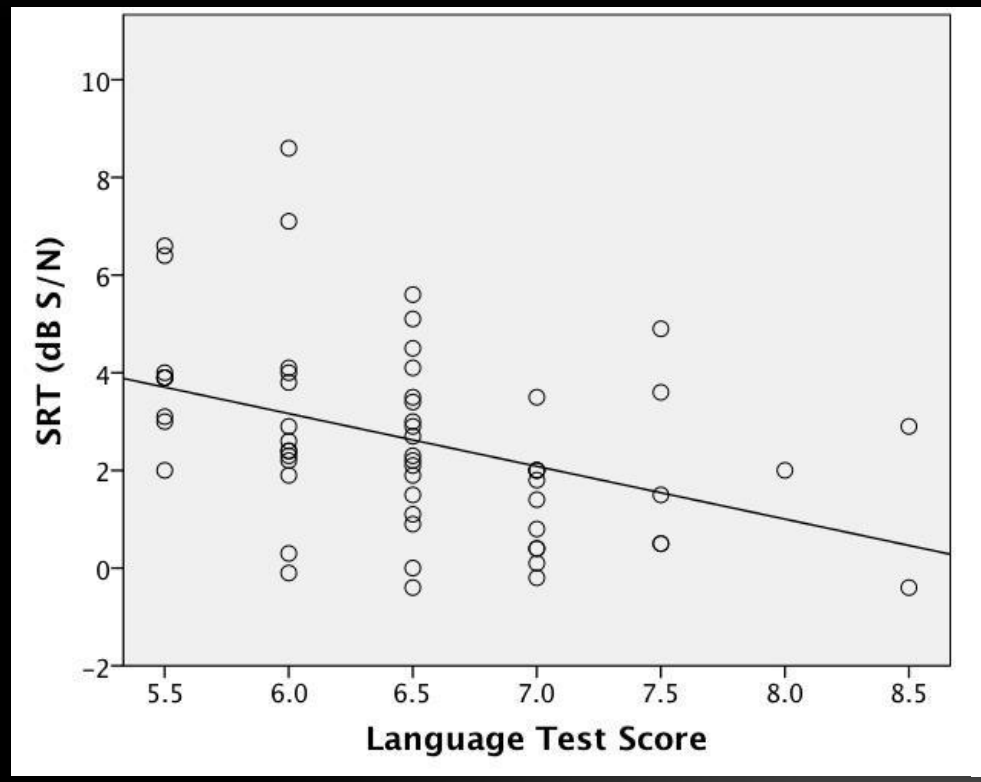
r = -.26

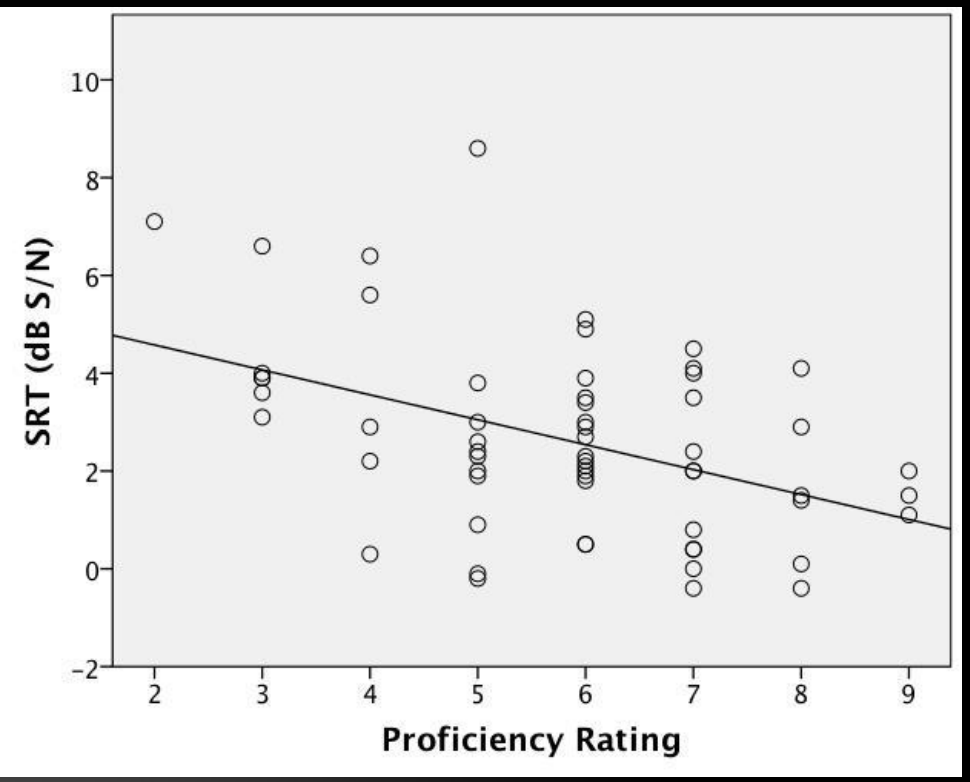


SRT AND PROFICIENCY IN SPEAKING

r = -.40

r = -.30





SPEECH PERCEPTION IN LATE BUT PROFICIENT BILINGUALS

- Difficulties noted when testing is conducted at threshold.
- Native-like perception is difficult for EFL learners to achieve, but their perceptual ability could still improve with increasing proficiency in English.
- Due to late acquisition and a lack of native English input, Chinese speakers of EFL experience greater difficulty recognizing English even if they are highly proficient.
- Quality and quantity of exposure are important to enhance speech perception by EFL speakers.

WORKING WITH MULTI-LINGUAL SPEAKERS

- Need to profile the language background of our clients when we do research and speech audiometry in clinic
- Note that even proficient EFL speakers have difficulties in quiet and worse in noise
- Account for reduction in speech perception ability
- Listener could serve as his own control for pre- and post-testing
- Note additional effects of non-native speech perception in a hearing impairment or auditory processing disorder

IMPLICATIONS ON LANGUAGE USE AT HOME

- Start early
- Exposure matters!
- Simultaneous bilingualism is ideal and probably does not affect L2 perception
  - Is hearing the L2 in the ambient environment adequate?
  - Monolingual norms could be applied
- Early EFL acquisition may still result in poorer speech reception, even if there is good quality/quantity exposure
  - Cautious application of monolingual norms
  - Could targeted training improve speech reception?

THANK YOU