D/hh students' literacy development in the SLCO Programme

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賽馬會手語雙語共融教育計劃
JOCKEY CLUB SIGN BILINGUALISM AND CO-ENROLMENT IN DEAF EDUCATION PROGRAMME

香港賽馬會慈善信託基金
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D/hh students' language development

- Many possible factors affect the language development of D/hh students:
  - Age at onset of hearing loss
  - Early identification and intervention for hearing loss
  - Use of advanced technologies
  - Quantity and Quality of linguistic input

- Observations:
  - There are still many D/hh children who are significantly delayed in spoken language skills despite use of advanced hearing technology (Lederberg et al., 2013).
  - D/hh children who experience a delay in spoken language development and who are educated using an oralist approach may be unable to develop language skills sufficiently enough to support communication or learning.

Literacy

- The ability to read and write
  - "critical for full participation in education and employment situations." (Lederberg, Schick, & Spencer, 2012:9)
  - "essential prerequisite for deaf people to participate successfully in society." (Swanwick & Watson, 2005:55)

- **D/hh students' literacy**
  - Average literacy outcomes have remained significantly below those of hearing for many decades (Spencer & Marschark, 2010).
  - Even when D/hh students (age 8 – age 18) are performing at grade level, their language skills are lower than hearing peers (Traxler, 2000).

Previous Literature: Factors contributing to literacy acquisition

- **Vocabulary**
  - Expressive vocabulary knowledge can predict reading achievement of D/hh students (Hermans et al., 2008; Kyle & Harris, 2006)
- **Grammar**
  - Grammatical knowledge of English played an important role in D/hh students' reading ability (Kelly, 1996)
- **Phonological processing skills**
  - The ability to use spoken phonological knowledge for decoding printed words;
  - Access to the phonological system benefits the reading of written language for those D/hh students with functional hearing (see Lederberg, Schick & Spencer, 2012)

D/hh students:
Vocabulary and syntactic abilities have stronger predictive power in terms of literacy development than phonological processing skills.

Previous Literature: D/hh students' language profile

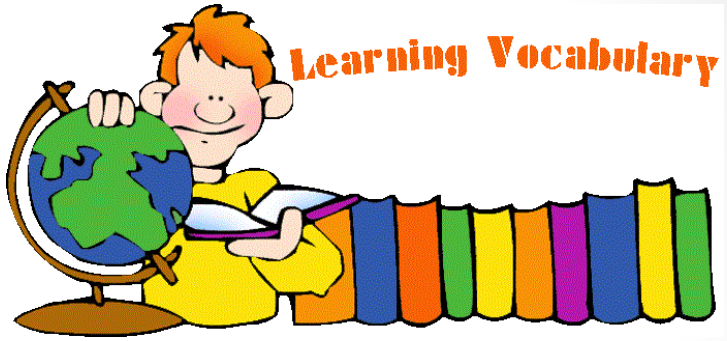
- **Vocabulary:**
  - It is suggested that phonetic and phonological delays influence vocabulary growth in young children with hearing impairment (subjects were mild-moderate to profound) (Moeller et al., 2007);
  - D/hh students have smaller and less sophisticated print vocabularies than hearing students;

- **Grammar:**
  - D/hh students' sentences are often shorter and simpler than the hearing students', with fewer complex structures;
  - Lagging years behind hearing peers in knowledge of English grammar; BUT
  - Displaying similar developmental patterns with similar errors (Quigley et al., 1976; Berent, 1988; Paul, 1998);

Research questions

- If given an alternative approach to education where there is access to sign language to support their language development, would sign language have an effect on D/hh students' literacy development?

- Misconception about Sign Language (debilitative effects):
  - SL impedes the written language development of D/hh children?
    - Overall language development?
    - Vocabulary?
    - Grammar?



ASSESSMENT OF VOCABULARY KNOWLEDGE: RECEPTIVE AND EXPRESSIVE

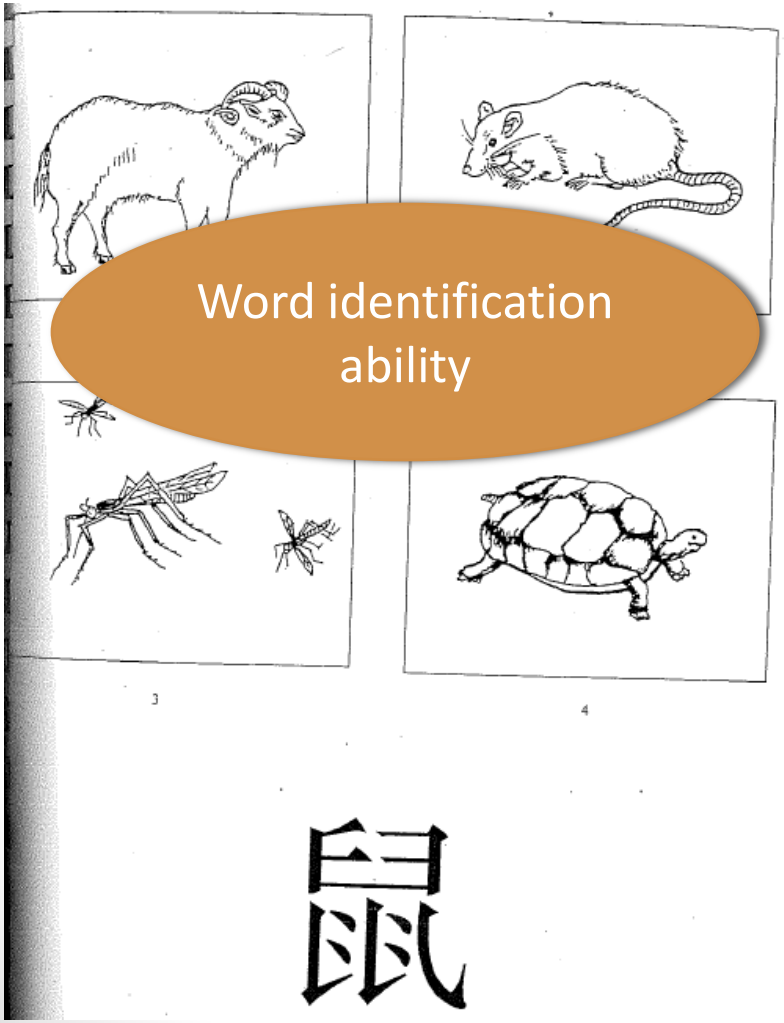
Materials

- Pre-school and Primary Chinese Literacy Scale (PPCLS) (Li, 1999)
  - Measure the size of written Chinese vocabulary of hearing children up to Grade 3.
  - 4 subscales: A, B, C & D

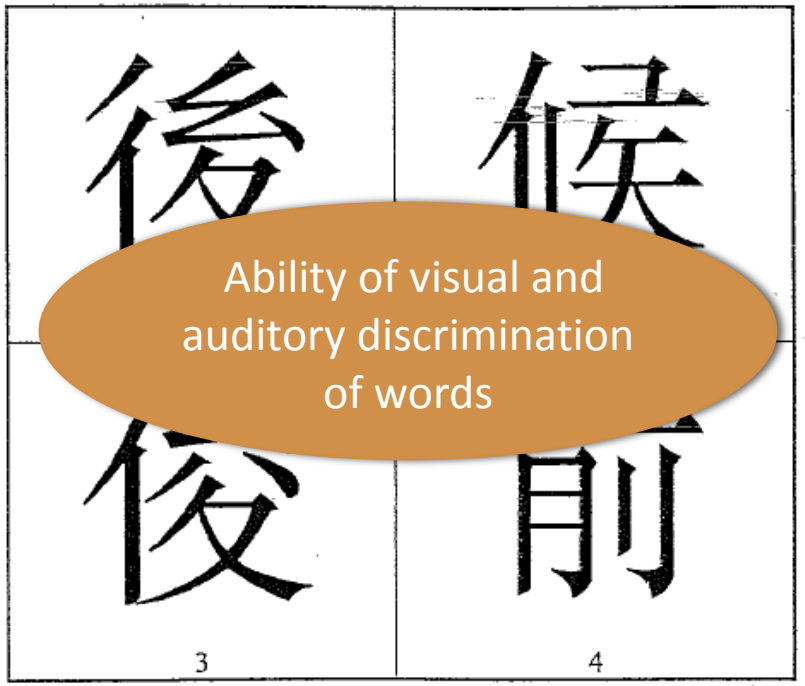
PPCLS Subscales (Li & Rao, 2000)	No. of items	Aims (Li & Rao, 2000)	Vocabulary knowledge involved
A: Picture-character matching	25	Assessing children's word identification ability	Receptive (written words)
B: Listen-and-point	20	Assessing children's ability of visual and auditory discrimination of words	Receptive (spoken words)
C: Point-and-read	75	Assessing children's character recognition ability	Expressive (morpheme level)
D: Read-and-say	80	Assess children's productive vocabulary ability	Expressive (word-/sentence level)

Receptive Vocabulary: Sample items

Subscale A: Picture-character matching



Subscale B: Listen-and-point

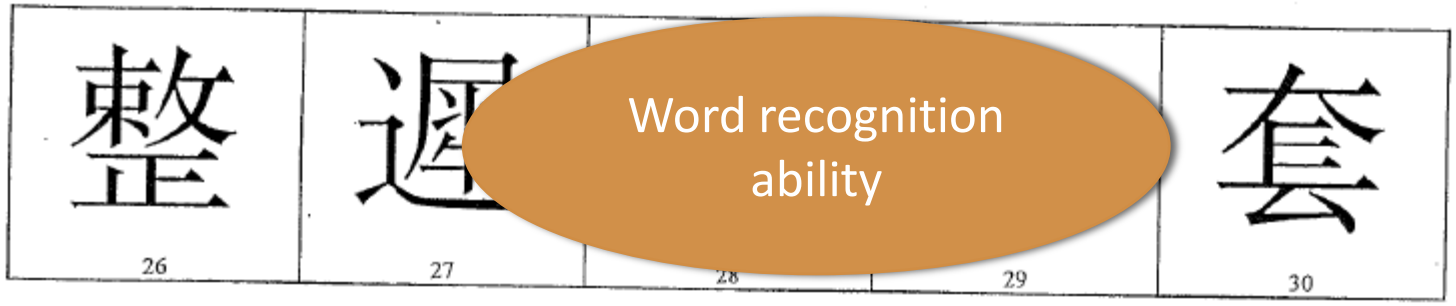


Ability of visual and auditory discrimination of words

測驗 B: 聽音指字, 項目 8

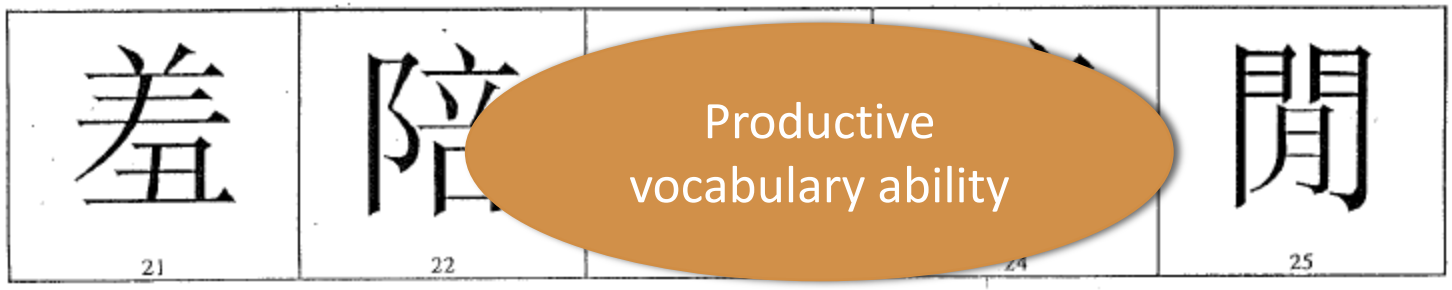
Expressive vocabulary: Sample items

Subscale C: Point-and-read



Word recognition ability

Subscale D: Read-and-say



Productive vocabulary ability

Participants of PPCLS: SLCO D/hh and Hearing students

hearing status	Age (in month)	Year 0 (Pre-Grade 1)	Year 1 (Post-Grade 1)	Year 2 (Post-Grade 2)	Year 3 (Post-Grade 3)
D/hh (n=18)	Mean	85	94	106	118
Hearing (n=60)	Mean	75	83	95	107

- D/hh students
  - Hearing loss at the better ear:
    - Moderately severe (n=1);
    - Severe (n=6);
    - Profound (n=11);
  - Except for hearing loss, NO other problems reported;

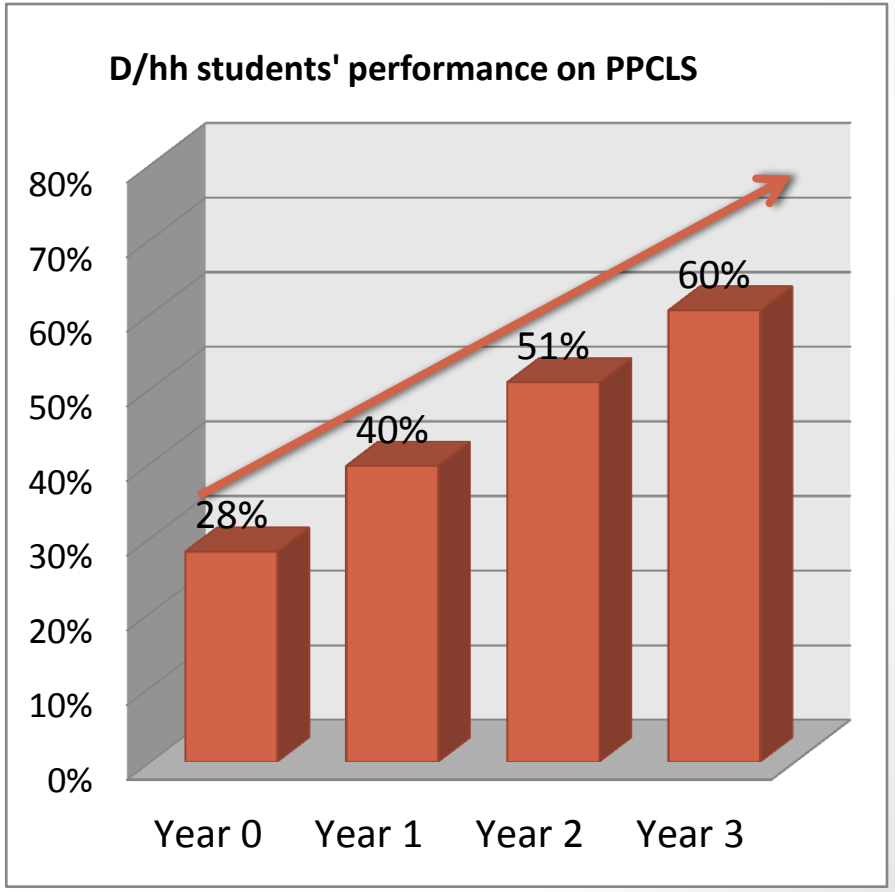
Results: Vocabulary development

Literature:

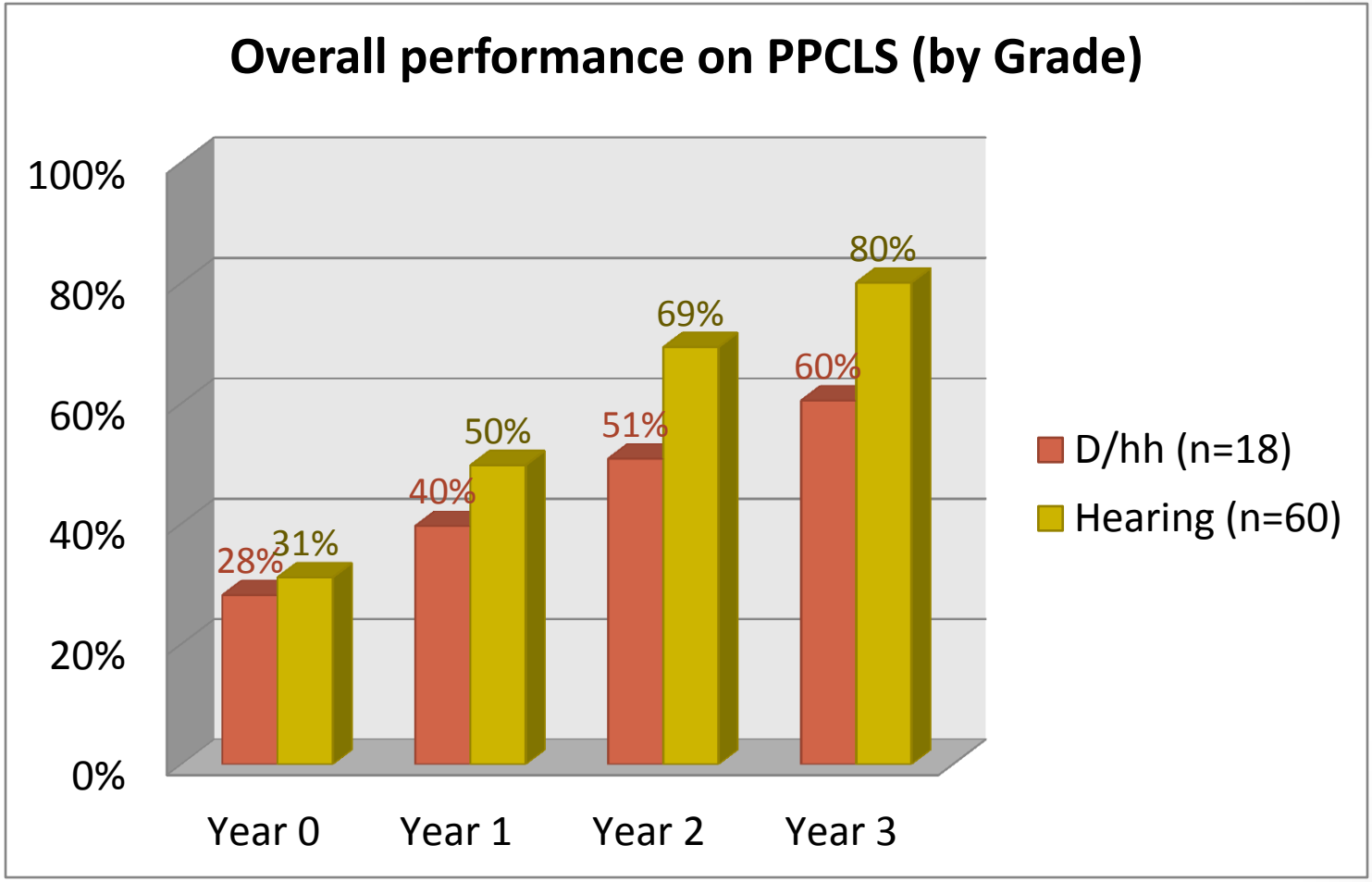
- Peabody Picture Vocabulary Test (PPVT) (Alegria, 2004)
- Vocabulary size of high school students = pre-school hearing children

Current study:

- A general increasing trend as the grade level moves up;
- ANOVA with repeated measures: D/hh students made significant progress in vocabulary knowledge over time in the SLCO environment;

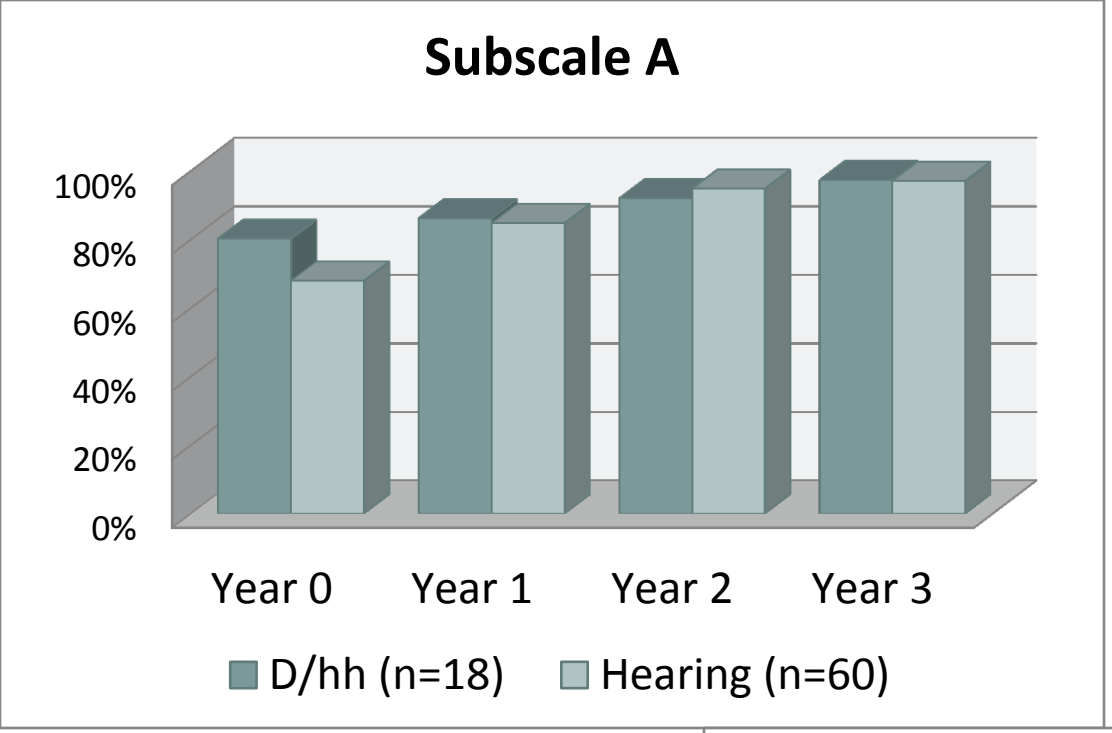


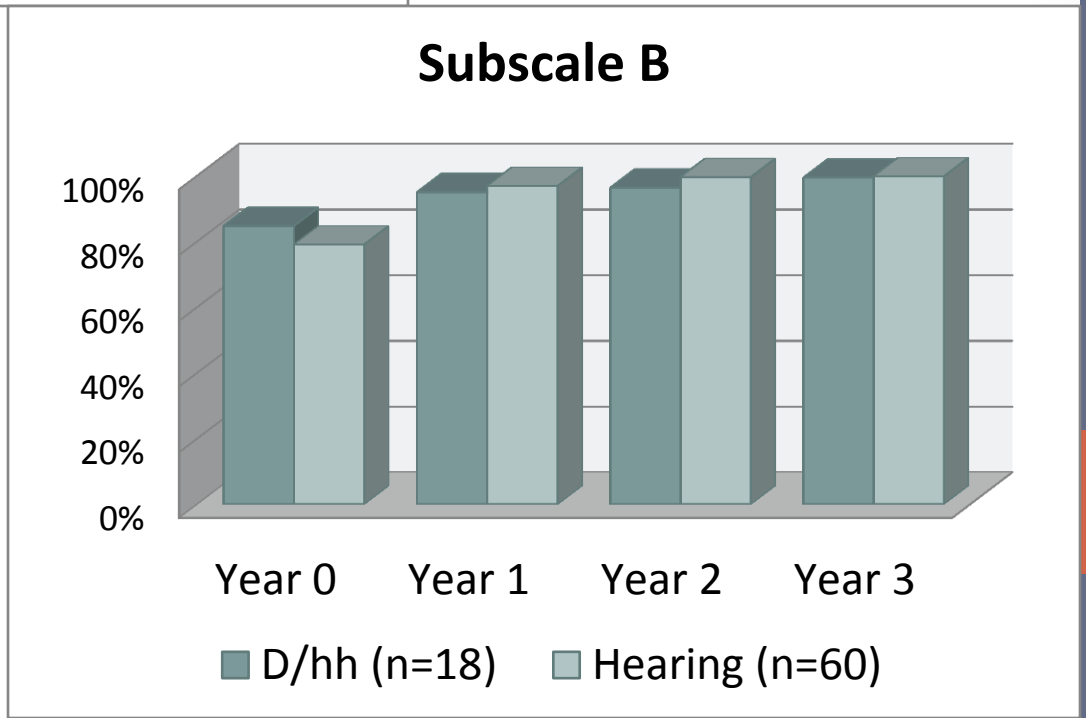
Results: Vocabulary assessment



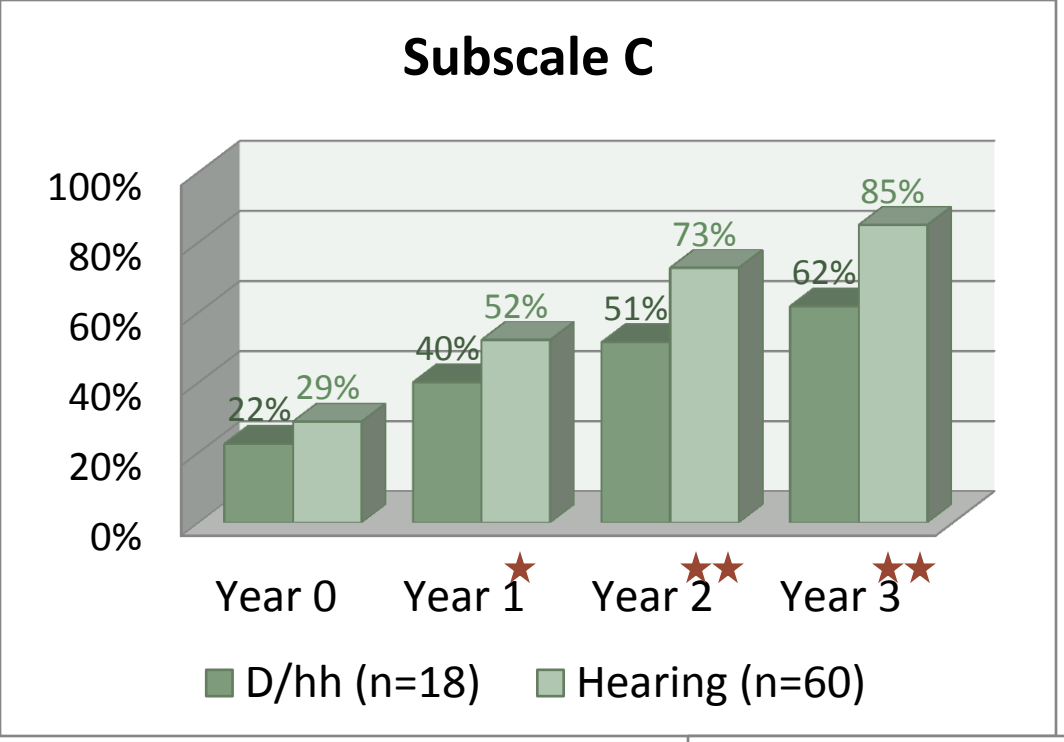
- D/hh students' vocabulary size is still lagged behind.
- Where does their difference lie?

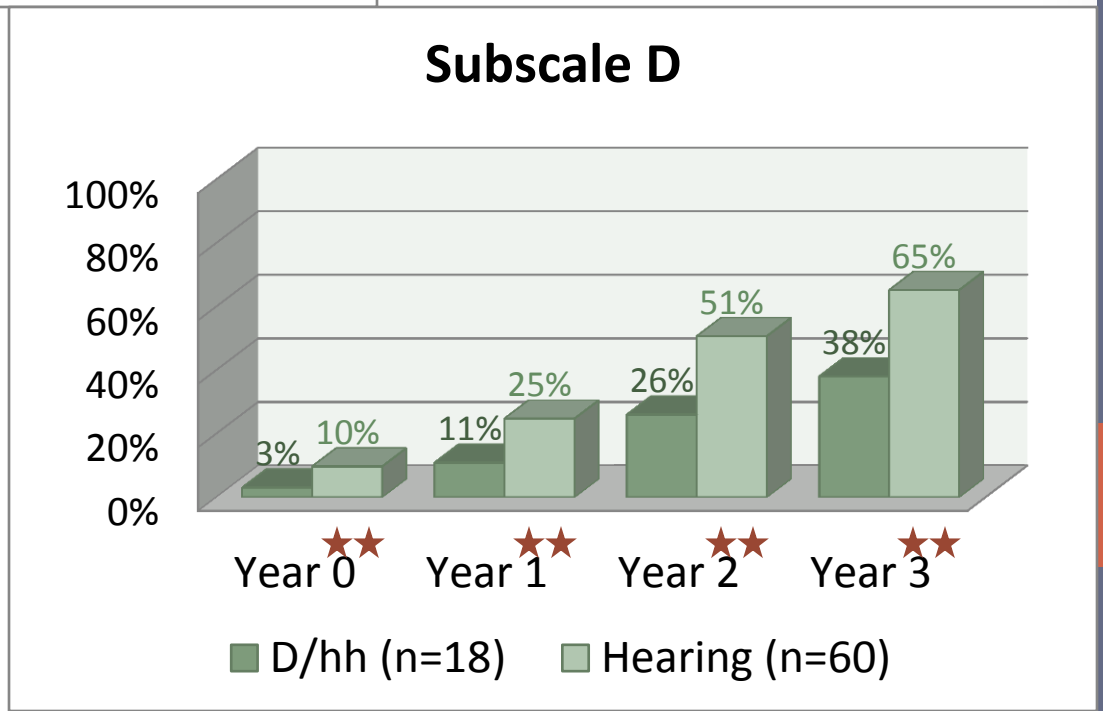
Receptive Vocabulary





**Expressive Vocabulary



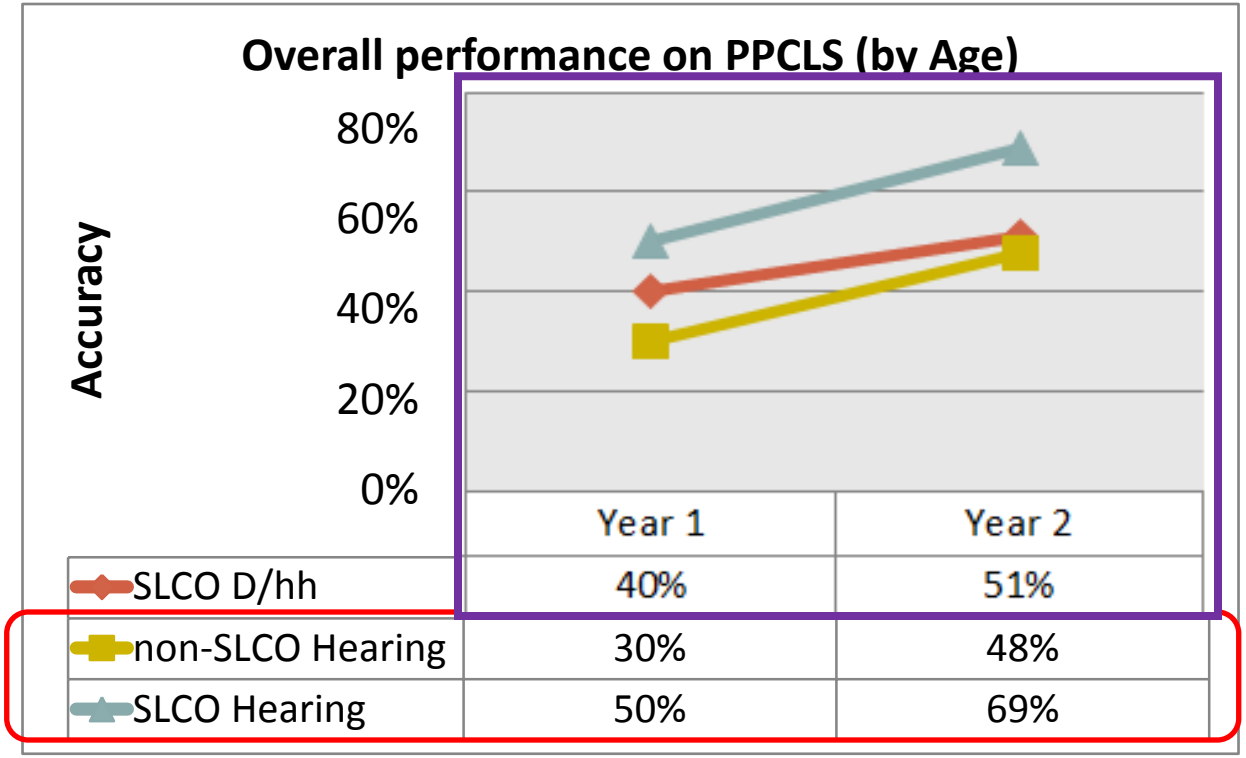


Interim Summary:

- **Receptive vocabulary ability** between D/hh students and hearing peers is **similar;**
- **Expressive vocabulary ability** between D/hh students and hearing peers is **different;**

→It could be due to task effects for subscales C & D of PPCLS. Most D/hh subjects were profoundly deaf (11/18), with poor speech intelligibility.

Does sign language negatively impact hearing students' Chinese vocabulary ? **NO!**



	Mean age 7	Mean age 8
SLCO D/hh	Year 0	Year 1
non-SLCO Hearing	Year 1	Year 2
SLCO Hearing	Year 1	Year 2

- Compare with non-SLCO hearing in HK [age 7, n=131 (Li et al., 2011); age 8, n=44 (Li et al., 2008)]
  - SLCO hearing students performed much better than non-SLCO hearing students;
  - SLCO D/hh students's performance was closer to that of non-SLCO hearing students;

ASSESSMENT OF GRAMMATICAL KNOWLEDGE

Material

- Assessment of Chinese Grammatical Knowledge (ACGK)
  - 15 grammatical structures & 4 tasks

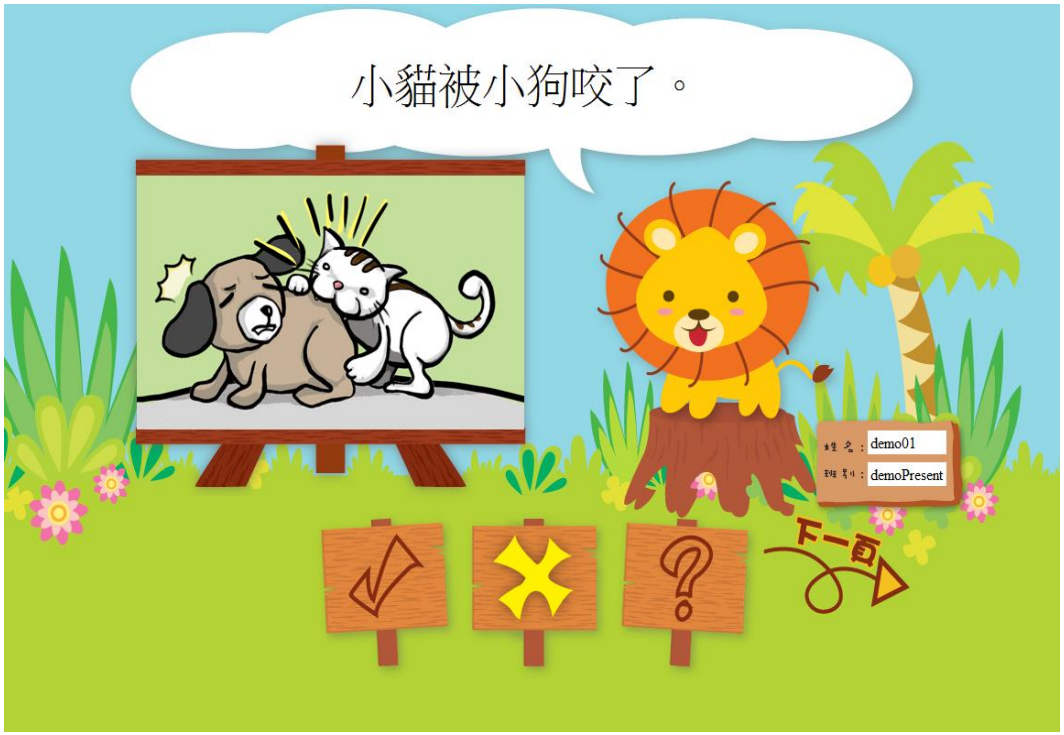
Task: Word Reordering (火車排排看)

Structures tested in Word Reordering
Ba-construction 「把」字句
Bei-construction (passive) 被動句
Double Object Construction 雙賓句
Locative Existential Sentences 處所存在句
Modals 情態動詞句
Negations 否定句
Questions 疑問句

Task: Picture Selection (圖片選選看)

Structures tested in Picture Selection
Binding (reflexive & pronoun) 約束句 (自己 & 他)
Comparatives 比較句
Object Control Sentences 賓語控制句
Prepositions (*cong /xiang /zai*) 介詞 (從 / 向 / 在)
Relative clauses 關係子句 (SSi & SOi)

Task: Picture-Sentence Match (小獅子說得對嗎？)



Structures tested in Picture-Sentence Match
Aspect (progressive & perfective) 體貌詞 (在 & 了)
Ba-construction 「把」字句
Bei-construction (passive) 被動句
Quantification (all/some /every) 量化 (所有/有些 / 每)

Task: Fill-in-Blank (選詞填充大作戰)

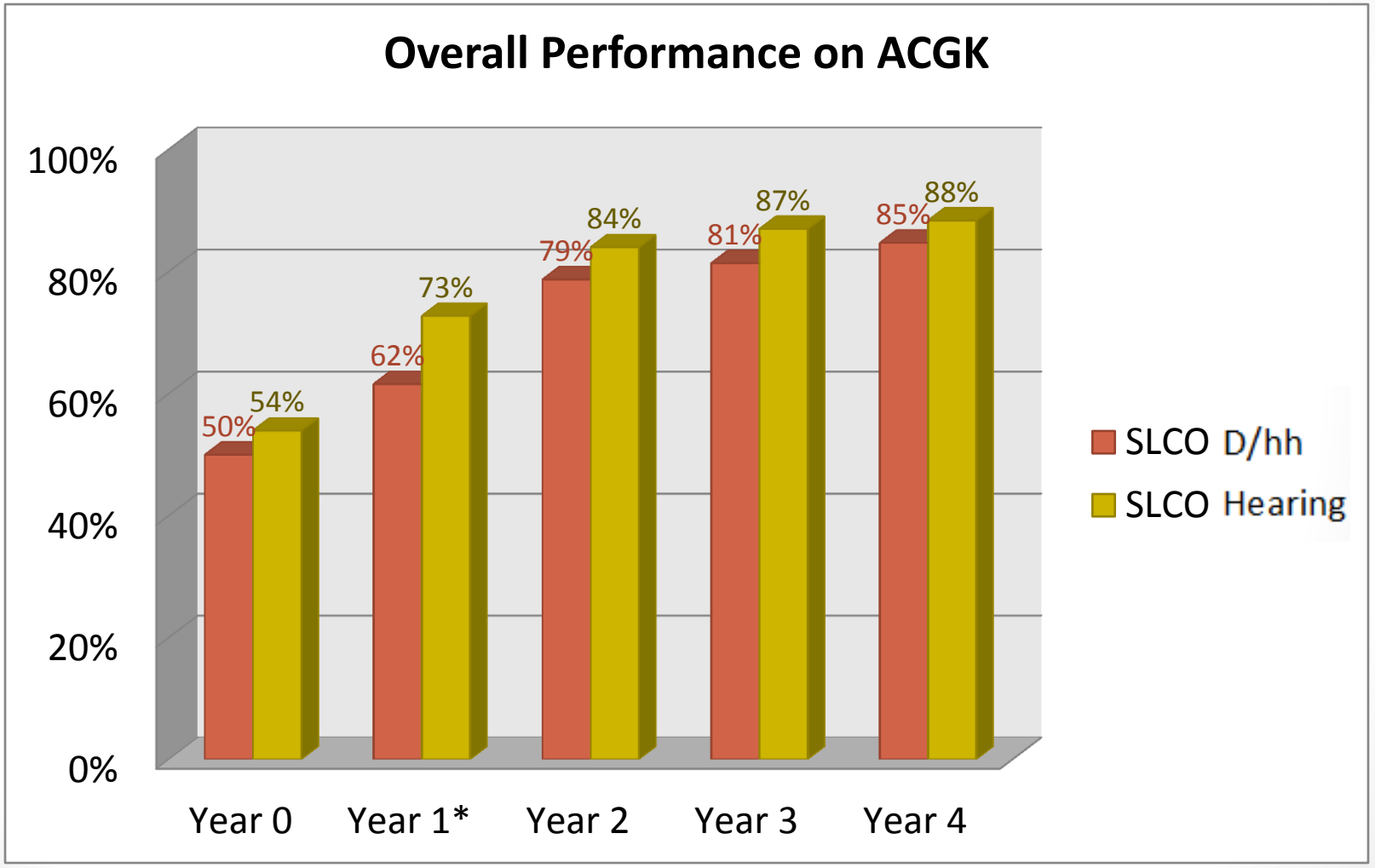
Structures tested in Fill-in-Blank
Morpheme Distinction 結構助詞 (的 /地 /得)
Negators (*bu* & *meiyou*) 否定詞 (不 & 沒有)
Prepositions (*dui/gen/cong/xiang/zai*) 介詞 (對/跟/從/向/在)
Question (wh-words) 疑問詞

Participants of ACGK: SLCO D/hh and Hearing students

Grade	Hearing status	No. of students
Year 0 (Pre-Grade 1)	D/hh	11
	Hearing	51
Year 1 (Post-Grade 1)	D/hh	11
	Hearing	58
Year 2 (Post-Grade 2)	D/hh	12
	Hearing	56
Year 3 (Post-Grade 3)	D/hh	13
	Hearing	63
Year 4 (Post-Grade 4)	D/hh	13
	Hearing	69

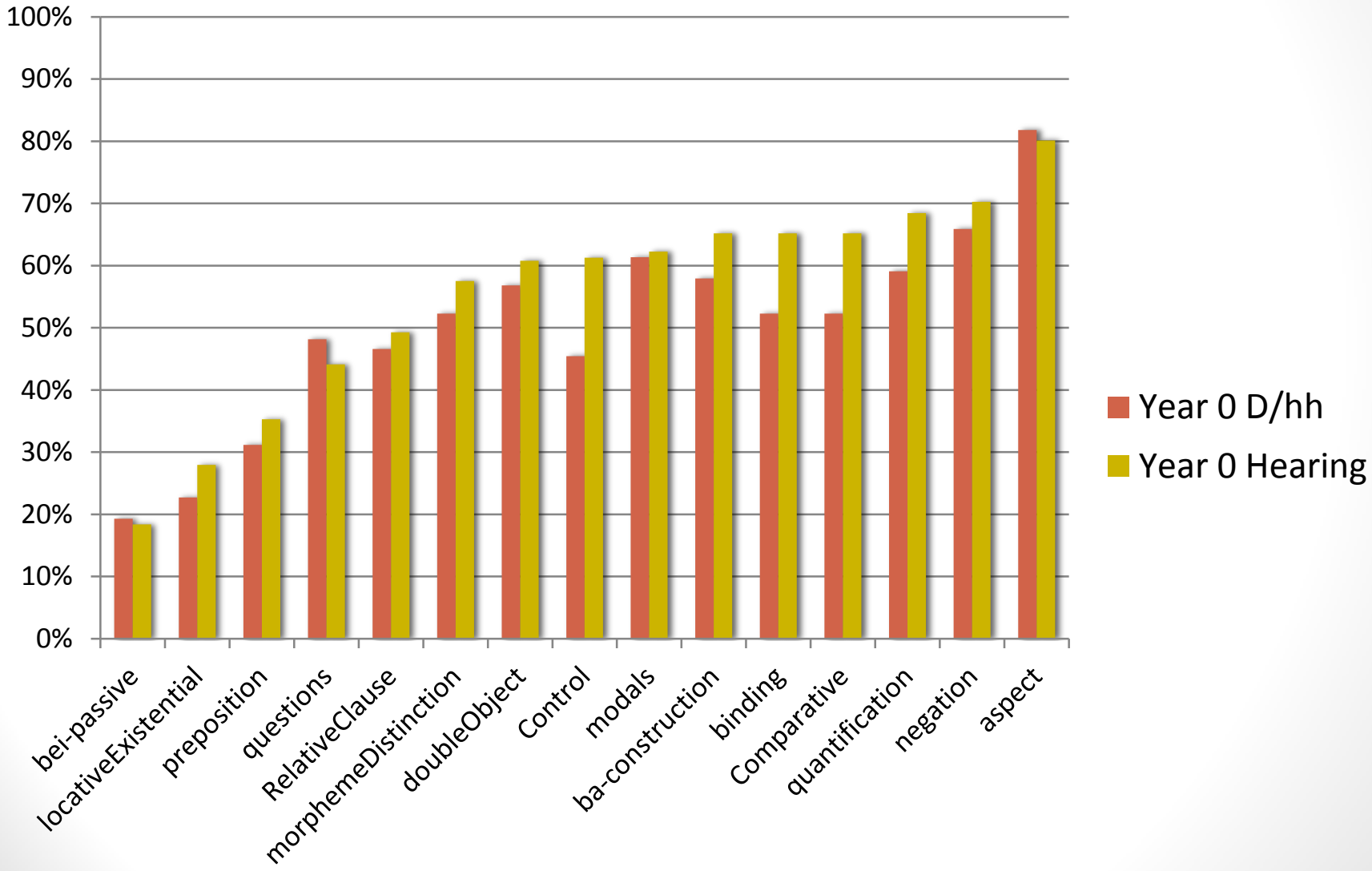
- D/hh students (26 in total)
  - Hearing loss:
    - Moderately severe (n=4);
    - Severe & Profound (n=22);
  - Except hearing loss, NO other problems reported;

Results: Grammatical development

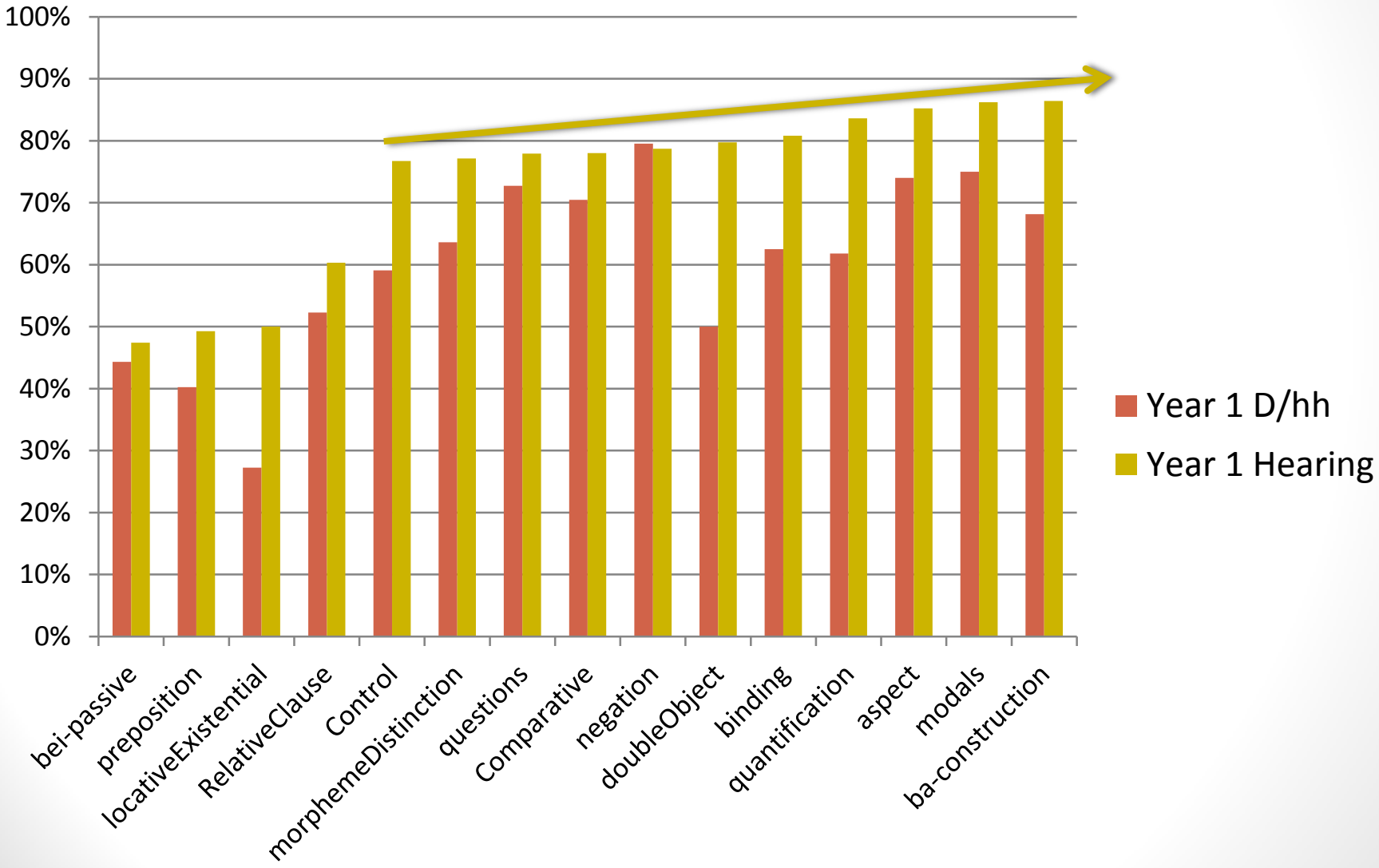


Year 1*	t(67) = -2.172, p=.033

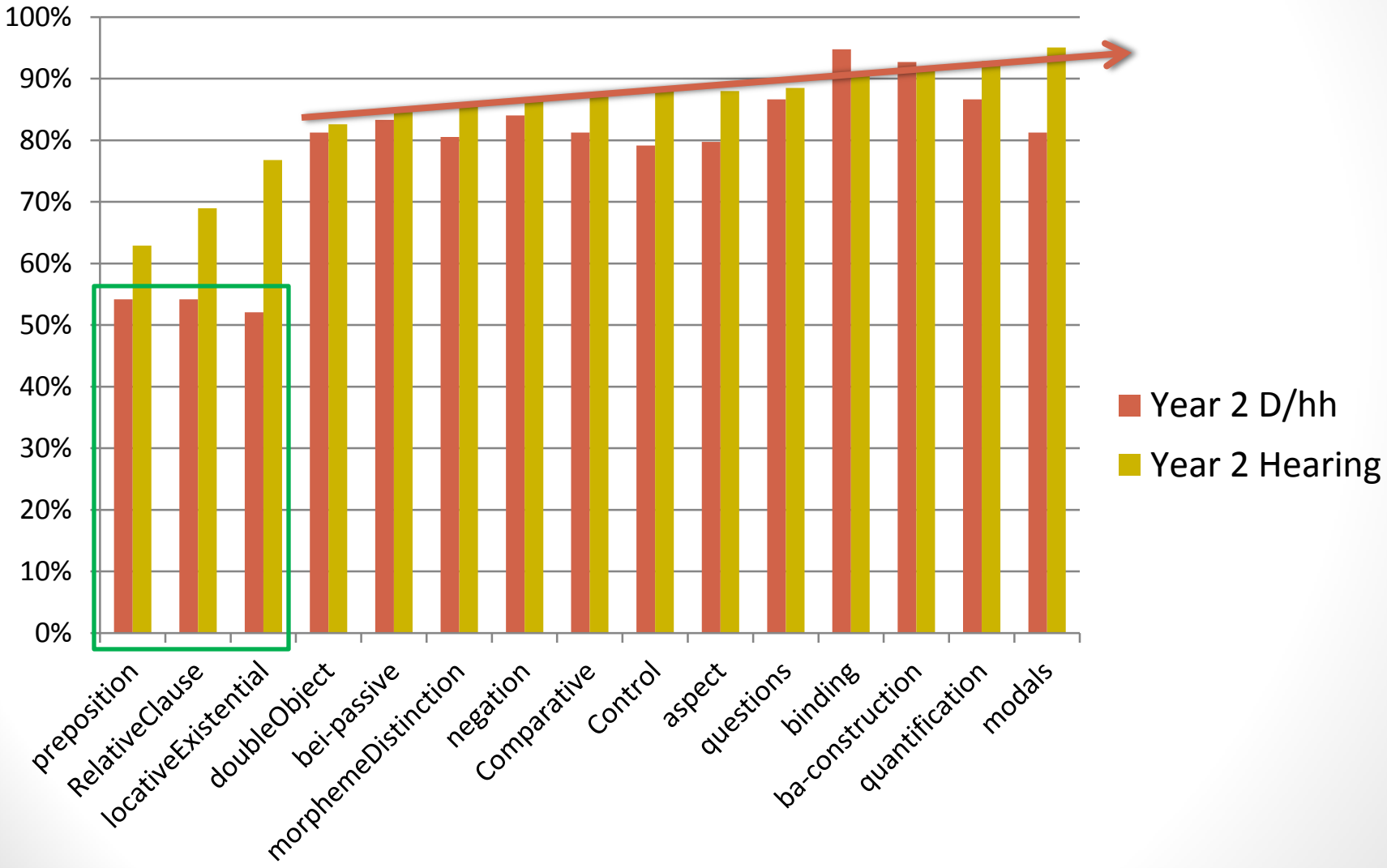
Results of Year 0: by structure



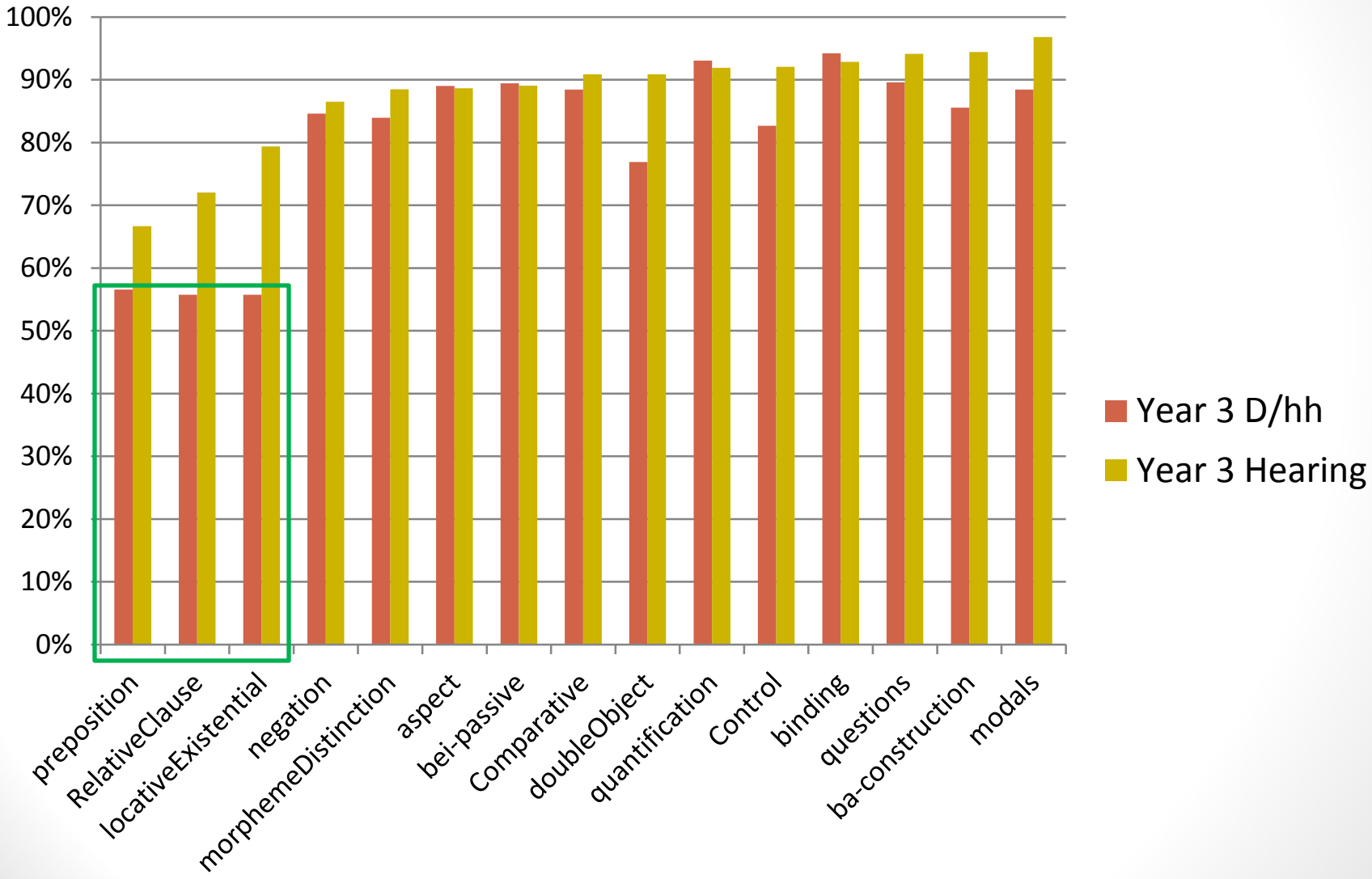
Results of Year 1: by structure



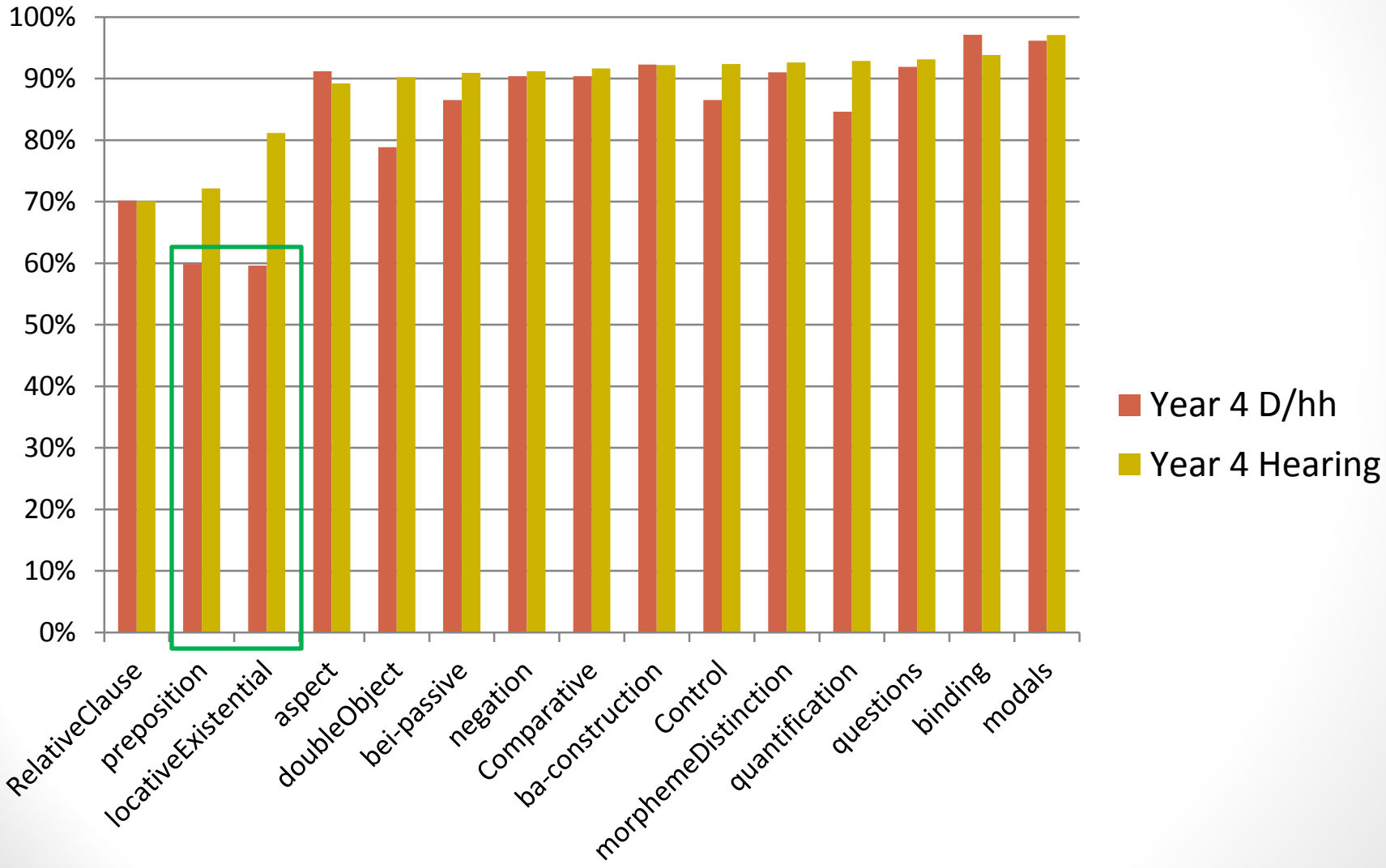
Results of Year 2: by structure



Results of Year 3: by structure



Results of Year 4: by structure



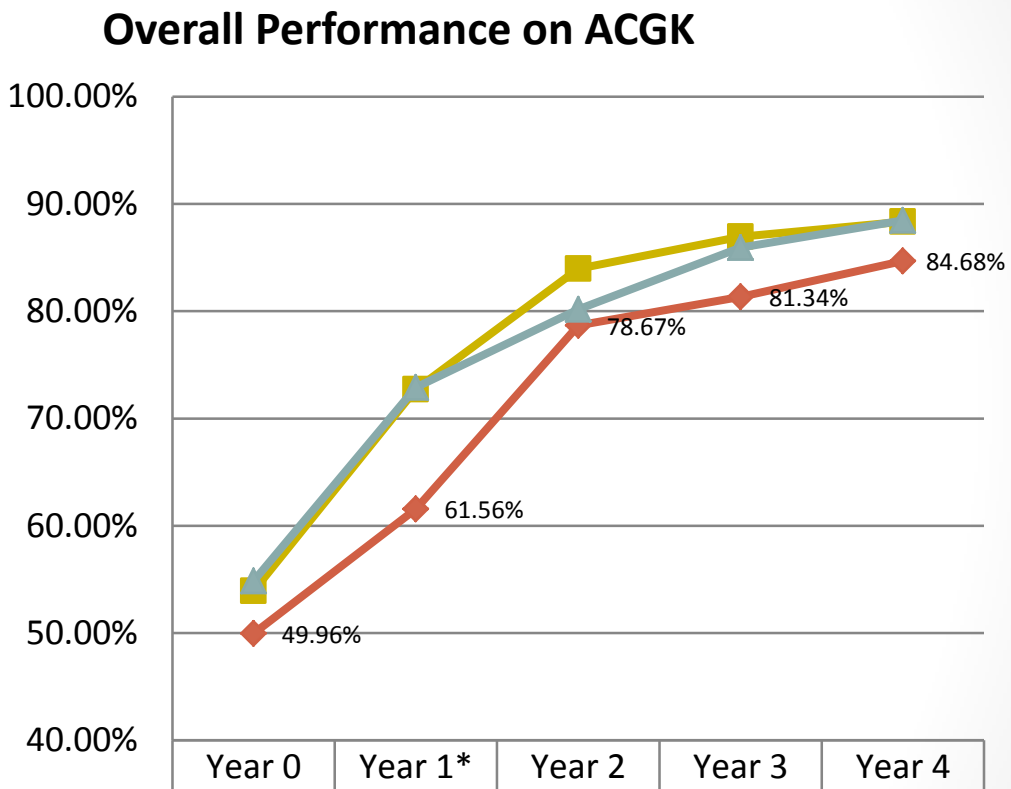
Interim Summary:

- Students' grammatical knowledge improved gradually over time:
  - No difference was found in Year 0, when they enter PS;
  - Hearing students improved greatly after one year's exposure, from Year 0 to Year 1; While D/hh students made great progress after one more year's exposure, from Year 1 to Year 2.
  - No difference between D/hh students and hearing students was found from Year 2 onwards.

- **D/hh students experience difficulties with:**
  - Syntactically complex sentences, such as relative clauses;
  - Structures mismatch between grammatical relation and argument structures, such as locative existential sentences;
  - Functional elements, such as prepositions.

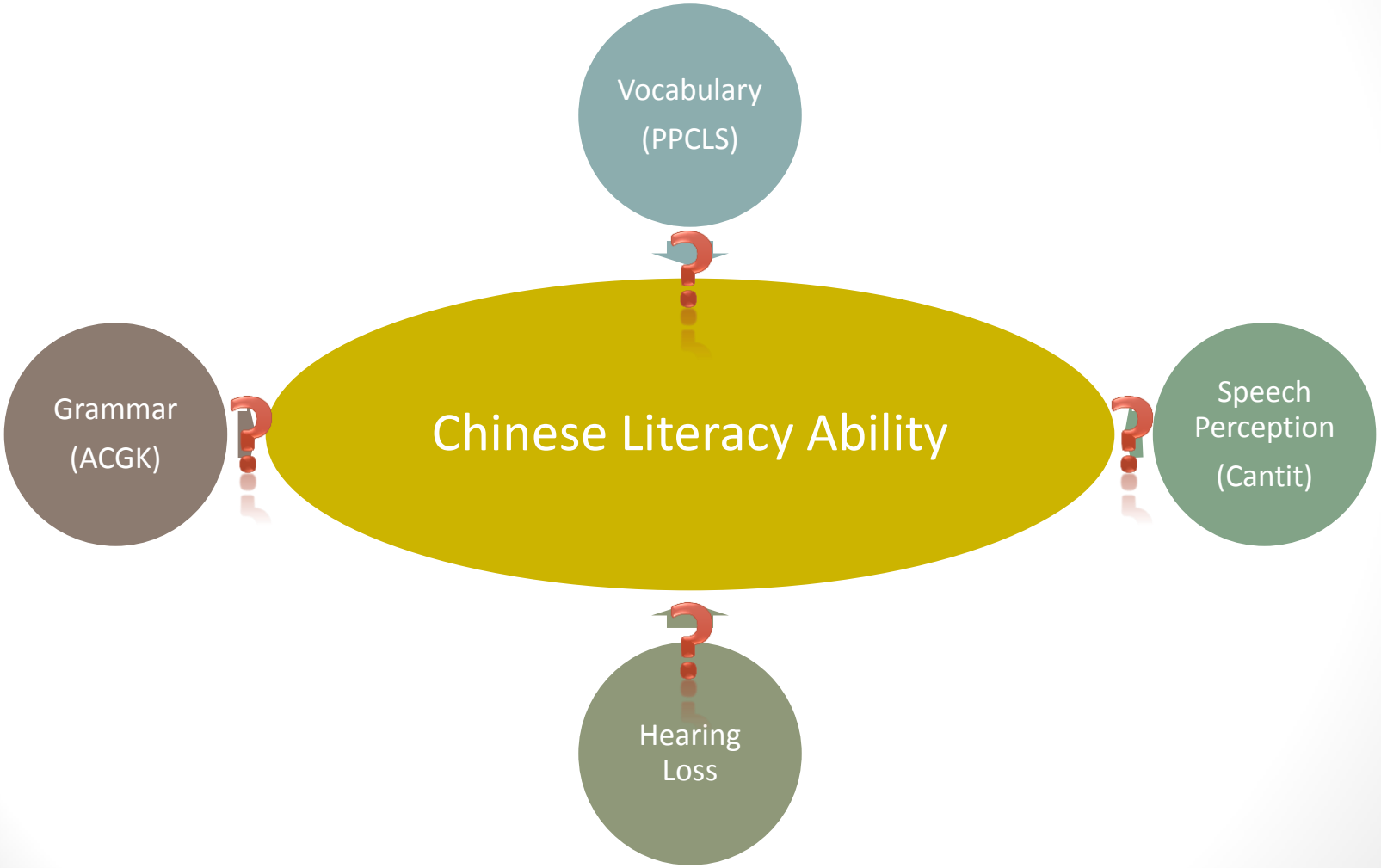
Does sign language negatively impact hearing students' Chinese grammar? **No!**

Grade	Students	No.
Year 0	SLCO deaf	11
	SLCO hearing	51
	non-SLCO hearing	255
Year 1	SLCO deaf	11
	SLCO hearing	58
	non-SLCO hearing	203
Year 2	SLCO deaf	12
	SLCO hearing	56
	non-SLCO hearing	220
Year 3	SLCO deaf	13
	SLCO hearing	63
	non-SLCO hearing	206
Year 4	SLCO deaf	13
	SLCO hearing	69
	non-SLCO hearing	208



	Year 0	Year 1*	Year 2	Year 3	Year 4
SLCO deaf	49.96%	61.56%	78.67%	81.34%	84.68%
SLCO hearing	53.93%	72.71%	83.97%	86.95%	88.34%
non-SLCO hearing	54.83%	72.91%	80.18%	85.94%	88.48%

What contributes to D/hh students' Chinese Literacy development?



Regression analysis:

Factors / variables	Mean	Minimum	Maximum	Range	Std. Deviation
Hearing Loss (dB)	99 dB	60 dB	120 dB	60	19.607
Speech perception ability (Cantit, %)	70.28%	30.00%	96.67%	.6667	.1992
Vocabulary knowledge (PPCLS, %)	64.46%	47.50%	80.50%	.3300	.1006
Grammatical knowledge (ACGK %)	80.97%	58.27%	94.49%	.3622	.1157

- **Dependent Variable:**
  - Chinese literacy skills [i.e. reading comprehension (60%), writing skills (20%)]

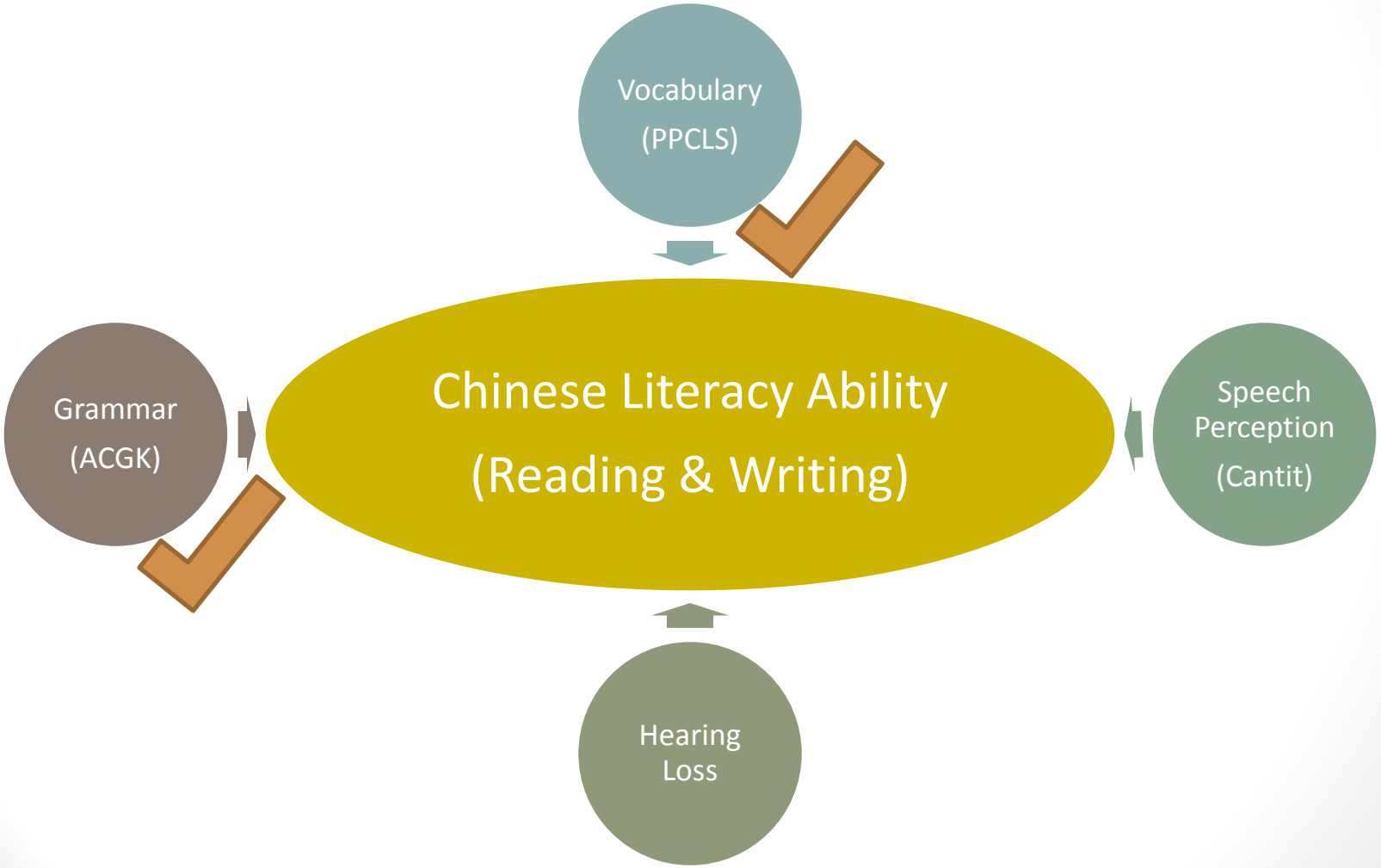
- **12 D/hh students:**
  - All assessments are tested at Grade 3;
  - Enrolled in SLCO Programme in K3, except 1 subject enrolled in Grade 1;
  - No other problems reported except hearing loss;
  - Hearing loss: Moderately severe (n=1), severe (n=3), profound (n=8);

Regression results

Correlations						
		Chinese Literacy	Hearing Loss (dB)	Speech Perception (Cantit)	**Grammar (CGA)**	**Vocabulary (PPCLS)**
Pearson Correlation	**Chinese Literacy**	1.000	-.315	.282	**.793****	**.915****
	Hearing Loss (dB)		1.000	-.066	-.218	-.344
	Speech Perception (Cantit)			1.000	.604*	.400
	Grammar (CGA)				1.000	.766**
	Vocabulary (PPCLS)					1.000

- The Regression model is significant, $F(4,7)=14.817$, $p<.01$, $R^2 = .834$;
- Predictors:
  - Hearing Loss (Beta = .000, $t(7)=-.003$, $p>.05$);
  - Speech Perception ability (Beta = -.241, $t(7)=-1.550$, $p>.05$);
  - Grammar knowledge (Beta =.397, $t(7)=1.793$, $p>.05$);
  - Vocabulary knowledge (Beta =.707, $t(7)=3.534$, $p<.05$);

In current study:
D/hh students' Chinese Literacy development



DISCUSSION

General Summary

- D/hh students' **general language abilities** (written Chinese) under the SLCO-Programme:
  - Vocabulary:
    - They made significant progress in vocabulary knowledge over time;
    - Receptive vocabulary knowledge is on par with the hearing peers;
    - Expressive vocabulary knowledge lags behind the hearing peers;
  - Grammar:
    - Grammatical knowledge improved gradually over time;
    - Developmental trend similar to hearing peers (the difference was found in Year 1 only);
- Regression analysis confirmed that vocabulary & grammar played an important role in D/hh students' literacy development.
- **Sign Language exposure:**
  - NOT impede the vocabulary and grammatical development of hearing children under the SLCO-Programme!
  - Learning a sign language in addition to spoken language has no negative effects on D/hh students' written language development!

Discussion

Is sign bilingualism debilitative in D/hh students' development of Chinese literacy?

- Sign bilingualism does not impede Chinese literacy development of D/hh students.
- Further confirmed Tang, Lam & Yiu's (2014) finding that SL does not create a negative impact on oral language and written language Chinese grammar.

- Hypothesis for future research:
  - Creating a learning environment conducive to acquiring both a spoken and a sign language benefits D/hh students' development of vocabulary and grammar, which are crucial ingredients for literacy development.

THANK YOU!