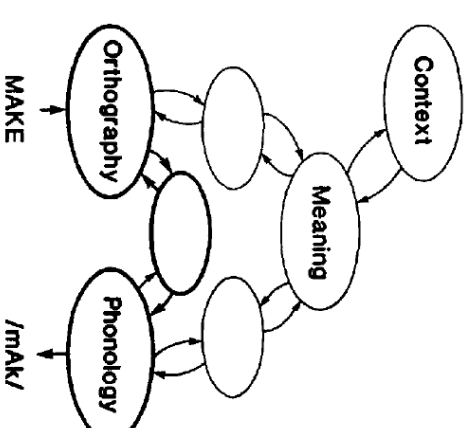


Implications



- Speech therapists play significant role in the management of children with written language disorders
- Similar training goals as typical oral language intervention
 - Learning the items
 - Acquiring the rules behind

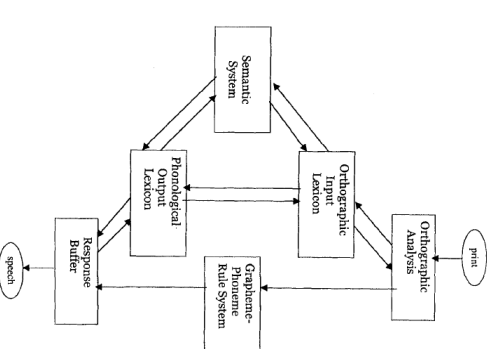
“Triangle” model (Seidenberg & McClelland, 1989)



Dual-route (cascaded) model (Coltheart et al., 2001)



- Regular words
 - E.g. hat
- Irregular (exception) words
 - E.g. pint
- Pseudowords
 - E.g. *smat*



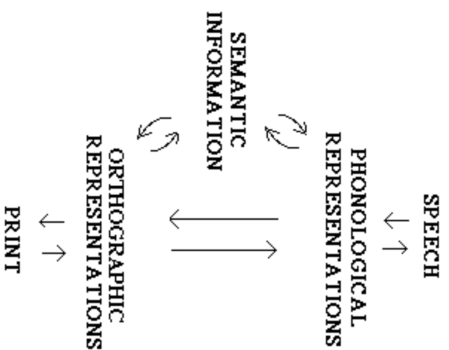


Figure 1: Functional model of reading and writing in Chinese

Knowing the rules

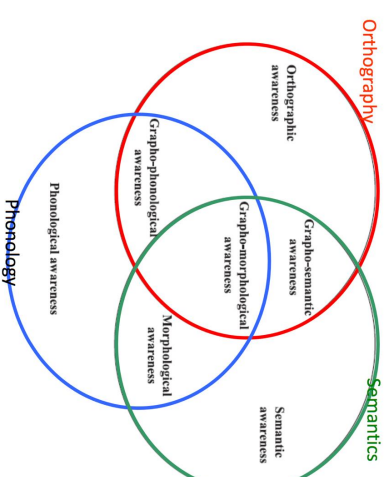
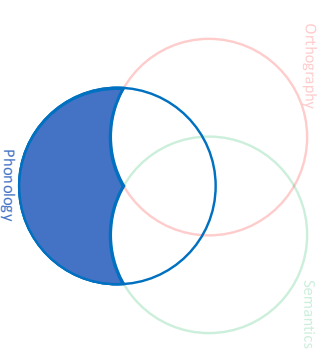


FIGURE 1 Interrelation between different aspects of metalinguistic awareness.

Kuo & Anderson (2006)

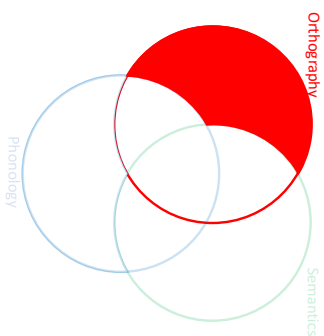


- Phonological awareness
- "... ability to reflect on and manipulate basic phonological units of a language ..." (Kuo & Anderson, 2006)
- E.g. say the word "clear" without the /k/



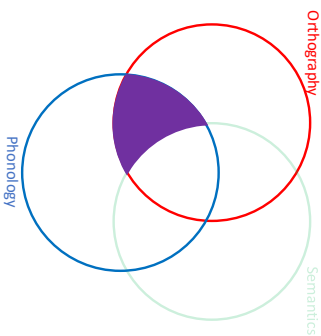
Orthographic awareness

- Basic orthographic units of a language
- Rules: E.g. What's "legal", what's "illegal" ...



Grapheme-phoneme correspondence (Ortho – Phono)

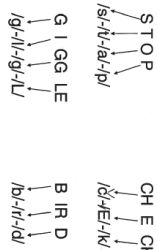
- E.g. hat
 - /h/
 - /æ/
 - /t/



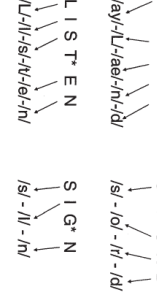
Con't

- Not that simple actually...

Connections for Regular Words



Connections for Irregular Words

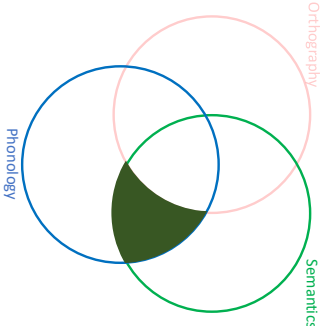


- Orthographic "patterns"

- E.g. "-ake" in "bake", "cake", "take", "wake"

Morphological awareness (Phono – Semantics)

- Basic meaningful units of a language (oral)
 - dogs = dog (plural)
 - teacher = teach + -er
- Knowledge about word combinations
 - cat vs cats
 - top vs stop

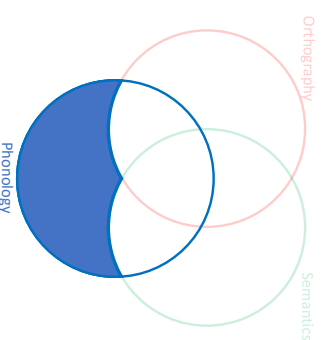


Applications in Chinese

We are PolyU - Together We Excel
我們是港大 - 共創非凡

Phonological awareness (Ho et al., 2007; McBride et al., 2003)

- Syllable deletion
 - 「電單車」唔講個「車」字係咩？
- Onset-Rhyme awareness
 - /si/ - /sa/ - /ce/ 邊個唔一樣呀？
 - /baa/ - /saa/ - /di/ 邊個唔一樣呀？



Empirical data

- McBride et al. (2003) JEP

Table 3
Hierarchical Regression Equation Predicting Chinese Character Recognition in Kindergarten (K3), Second-Grade (P2), and Combined Sample

Step and variable	K3		P2		Combined sample	
	ΔR^2	R^2	ΔR^2	R^2	ΔR^2	R^2
1. Age	.022	.022	.002	.002	.540***	.540
2. Visual matching cross out	.054	.076	.174***	.175	.092***	.631
3. Vocabulary elaboration	.188***	.263	.072**	.247	.050***	.681
4. Syllable deletion, onset-phoneme deletion	.042	.306	.045	.292	.018**	.699
5. Regular rhymic naming, regular object naming	.000	.306	.000	.292	.000	.699
6. Morpheme identification, morphological construction	.067**	.457	.034	.381	.031***	.756

* $p < .05$. ** $p < .01$. *** $p < .001$.

Empirical data

- Lau et al. (2015) CLP

Table 3. Standardized coefficient (β) and ΔR^2 at the two steps of HRA using accuracy scores in different reading tasks as dependent variables.

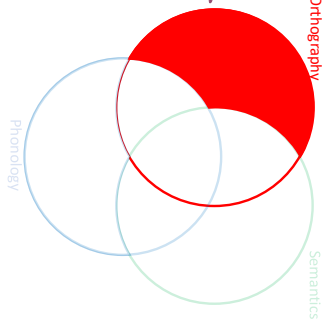
	β	T	ΔR^2
Dependent variable: non-phonetic compounds naming			
Step 1			.011***
Reven	.001	0.24	
Step 2			.078***
Phonological awareness - Rhyme	.015	2.34*	.008***
Phonological awareness - Syllable	.016	2.14*	.005***
Phonological awareness - Onset	.014	2.09*	.004***
Orthographic awareness	.014	2.29*	.004***
Phon. Ico	.016	3.09**	.004***
Phon. Real	.013	2.00*	.002*
Morphological awareness	.014	2.33*	.001*
Dependent variable: Irregular phonetic compounds naming			
Step 1			.016***
Reven	.007	1.35	
Step 2			.039***
Phonological awareness - Rhyme	.018	3.07**	.010***
Phonological awareness - Syllable	.022	3.52**	.007***
Phonological awareness - Onset	.011	1.86	.003***
Phonological awareness - Syllable	.014	2.54*	.001*
Morphological awareness	.014	2.54*	.001*
Phon. Real	.01	1.76	.001*
Dependent variable: Regular phonetic compounds naming			.010***
Step 1			.002
Reven	.002	0.29	
Step 2			.023***
Phonological awareness - Rhyme	.024	3.66***	.012***

* $p < .005$; ** $p < .001$; *** $p < .0001$.

Orthographic awareness



- Basic orthographic units of Chinese
- Word 詞語
- Characters 單字
- Radicals 聲旁 / 形旁
- Logographs 部件
- Strokes 筆劃



Empirical data



- Yeung et al. (2011) SSR

TABLE 3
Standardized Betas for Regression Equations Predicting Word Reading and Word Spelling from Reading-Related Skills Measured After Controls for Age, IQ, IQ & Oral Vocabulary

Final Step Predictor	Word Reading		Word Spelling			
	B	SE B	B	SE B		
Age	-0.02	0.33	0.00	-0.06	0.07	-0.04
IQ	0.14	0.10	-0.07	-0.01	0.02	-0.02
Oral vocabulary	-0.03	0.10	-0.03	0.00	0.02	-0.02
Phonological awareness	0.04	0.60	0.00	0.22	0.12	0.10
Orthographic skills	2.63	0.49	0.59***	0.25	0.10	0.15*

* $p < .05$. ** $p < .01$. *** $p < .001$.

TABLE 4
Unique and Common Contributions of Age, IQ & Oral Vocabulary, Orthographic Skills, and Morphological Awareness to Word Reading and Word Spelling

Predictor	Word Reading	Word Spelling
Unique contributions		
1. Age, IQ & oral vocabulary	0.025	0.020
2. Orthographic skills	0.097	0.027
3. Morphological awareness	0.065	0.132
Common contributions		
Common to 1 and 2	0.005	-0.001
Common to 1 and 3	0.005	0.062
Common to 2 and 3	0.009	0.039
Sum	0.369	0.280

Empirical data



- Lau et al. (2015) CLP

Table 3. Standardized coefficient (β) and ΔR^2 at the two steps of HRA using accuracy scores in different reading tasks as dependent variables.

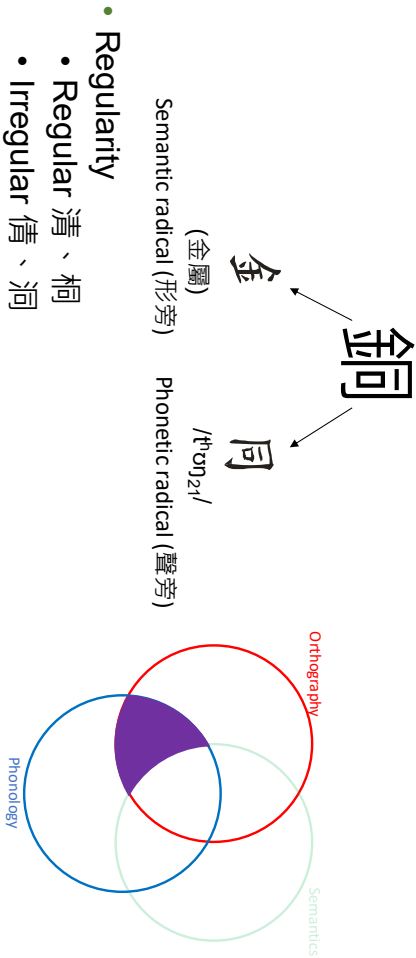
	β	r	ΔR^2
Dependent variable: non-phonetic compounds naming			
Step 1			0.11***
Reven	0.01	0.24	
Step 2			0.28***
Phonological awareness - Rhyme	0.15	2.34*	0.08***
Phonological awareness - Syllable	0.16	2.74**	0.05***
RAN	-0.11	-2.11*	0.05***
Dependent variable: irregular phonetic compounds naming			
Step 1			0.16***
Reven	0.07	1.25	
Step 2			0.30***
Phonological awareness - Rhyme	0.18	3.07**	0.10***
Phonological awareness - Syllable	0.12	3.01***	0.07***
RAN	-0.12	-2.32*	0.05***
Dependent variable: regular phonetic compounds naming			
Step 1			0.10***
Reven	0.02	0.29	
Step 2			0.29***
Phonological awareness - Rhyme	0.24	3.66***	0.12***
Phonological awareness - Syllable	0.24	3.66***	0.10***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Grapheme-phoneme correspondence (Ortho – Phono)



- Phonetic compound characters 形聲字



Empirical data



Learning to Read Chinese Beyond the Logographic Phase

Connie Suk-Han Ho, Peter Bryant

First published: 09 November 2011 | <https://doi.org/10.1598/RQ.32.3.3> | Citations: 154

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ABSTRACTS

This study investigated the role of phonetics for children learning to read Chinese. Participants were 45 Chinese first graders and 45 second graders recruited in Hong Kong. The study revealed that children name phonologically regular Chinese characters more accurately than irregular ones, and phonetic-related errors were the most dominant type in reading Chinese characters and words. There were statistically significant correlations among Chinese pseudocharacter reading, Chinese real character reading, and rhyme detection for the first graders. These findings suggested that Chinese first and second graders do rely on phonetics for sound cues in naming Chinese characters, and phonological awareness seemed to be important in learning these script-sound regularities in Chinese. It therefore appeared that beyond the logographic phase, there was also a phonological phase in learning to read Chinese.

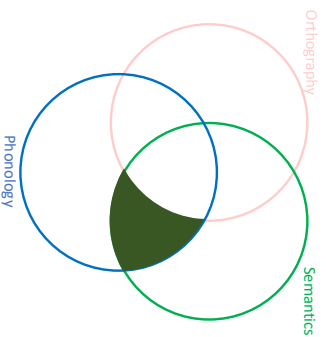
Morphemes



Smallest meaningful units of the language

- E.g. “Unchangeable”
- E.g. “月餅” /jyut6 beng2/ [mooncake]

Morphological awareness (Phono – Semantics)



Words can be classified as...



Monomorphemic words

- e.g. 手、狗

Multi-morphemic words

- e.g. 手錶、耳環、狗公園

Morphology of Chinese



- Inflectional
 - 黃色、藍色、紅色...
 - 我們、你們、他們...
- Aspect markers
- Derivation
 - 電腦化、羅馬化...
- Compounding
 - 手錶、凍飲...

Morphosyntax



- Compare the following:
 - 「龜速」 vs 「速龜」
 - 「潮童」 vs 「童潮」

Morphological awareness (Phono – Semantics)

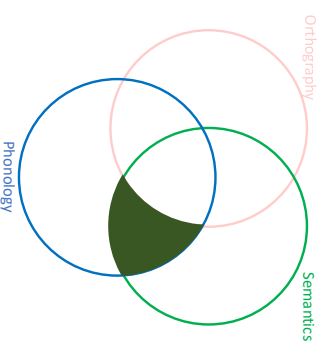


Manipulations of morphemes

- e.g. 龜、速、九十

Structure of words

- 龜速
- 九十後



Morphosyntactic structures



- Basically includes
 - 偏正 (e.g. 飛機、電腦)
 - 聯合 (e.g. 閱讀、朋友)
 - 述賓 (e.g. 出版、彈琴)
 - 述補 (e.g. 推廣、打開)
 - 主謂 (e.g. 民主、人為)

Empirical data

- Yeung et al. (2011) SSR

TABLE 3
Standardized Betas for Regression Equations Predicting Word Reading and Word Spelling From Reading-Related Skills Measures After Controls for Differences in Age, IQ, and Oral Vocabulary

Final Step Predictor	Word Reading		Word Spelling				
	B	SE B	B	SE B			
Age	-.002	0.33	0.00	-.06	0.07	-.04	0.04
IQ	0.14	0.10	0.07	-.01	0.02	-.02	0.02
Oral vocabulary	-.013	0.31	-.01	0.03	0.06	0.02	0.10
Phonological awareness	0.04	0.00	0.04	0.02	0.12	0.10	0.10
Phonological skills	-1.70	0.24	-.034***	0.15	0.05	-.016**	0.06
Orthographic skills	2.64	0.57	0.25***	0.70	0.12	0.36***	0.12
Morphological awareness							0.56***

* $p < .05$. ** $p < .01$. *** $p < .001$.

TABLE 4
Unique and Common Contributions of Age, IQ & Oral Vocabulary, Orthographic Skills, and Morphological Awareness to Word Reading and Word Spelling

Predictor	Word Reading	Word Spelling
Unique contributions		
1. Age, IQ & oral vocabulary	0.025	0.020
2. Orthographic skills	0.097	0.027
3. Morphological awareness	0.065	0.132
Common contributions		
Common to 1 and 2	0.005	-.001
Common to 1 and 3	0.005	0.062
Common to 2 and 3	0.023	0.001
Common to 1, 2 and 3	0.069	0.039
Sum	0.369	0.286

Con't

- Lau et al. (2015) CLP

Table 3. Standardized coefficient (β) and ΔR^2 at the two steps of HRA using accuracy scores in different reading tasks as dependent variables.

	β	T	ΔR^2
Dependent variable: non-phonetic compounds naming			
Step 1			0.11***
Raven	0.01	0.24	
Step 2			
Phonological awareness – Rhyme	0.15	2.34*	0.28***
Phonological awareness – Syllable	0.16	2.71**	0.05***
Phon. kno	0.14	2.29*	0.04***
Orthographic awareness	0.16	3.09**	0.03***
Morphological awareness	0.14	2.33*	0.01*
Step 1			0.16***
Raven	0.07	1.25	
Step 2			
Phonological awareness – Rhyme	0.18	3.07**	0.39***
Phon. kno	0.22	3.91***	0.07***
RAV	-.012	-2.32*	0.05***
Phonological awareness – Syllable	0.1	1.86	0.03***
Morphological awareness	0.14	2.54*	0.01*
Step 1			0.10***
Dependent variable: Regular phonetic compounds naming			
Raven	0.02	0.29	
Step 2			
Phonological awareness – Rhyme	0.24	3.66***	0.12***
Phryln_kno	0.24	3.66***	0.10***

* $p < .005$; ** $p < .001$; *** $p < .0001$.

Con't

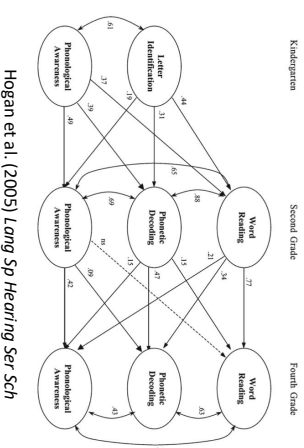
- Tong et al. (2011) JRR

Table 4. Hierarchical regression predicting Chinese word reading across times 1–3, and time 3 Chinese word dictation from all time 1 measures, controlling for time 1 Chinese word reading.

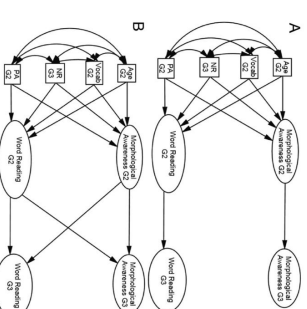
Step and variables	T2 word reading		T3 word reading		T3 word dictation	
	ΔR^2	β	ΔR^2	β	ΔR^2	β
1. T1 controlled variables and word reading	.664***	.786***	.413***	.575***	.297***	.345***
2. T1 morphological construction	.000	-.087	.000	-.060	.001	-.052
3. T1 homophone identification	.014**	.127**	.012	.125*	.004	.073
4. T1 visual-spatial relationships	.008*	.094*	.015	.144*	.013*	.130*
5. T1 syllable deletion	.012**	.141**	.006	.099	.010	.130
2. T1 syllable deletion	.013**	.677	.009	.423	.015*	.312
3. T1 visual-spatial relationships	.002	.680	.008	.430	.007	.319
4. T1 homophone identification	.003	.683	.001	.432	.001	.320
5. T1 morphological construction	.013*	.698	.014	.446	.005	.325
2. T1 syllable deletion	.014**	.693	.013	.444	.004	.323
3. T1 visual-spatial relationships	.002	.680	.008	.430	.007	.319
4. T1 homophone identification	.003	.683	.001	.432	.001	.320
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Note: The capitalised T and its numeral at the end of each variable represent the time in which it was measured. * $p < .10$; ** $p < .05$; *** $p < .01$.

Reciprocal relationship



Hogan et al. (2005) Long Sp Hearing Ser Sch



Deacon et al. (2013) Dev Psy

Implications

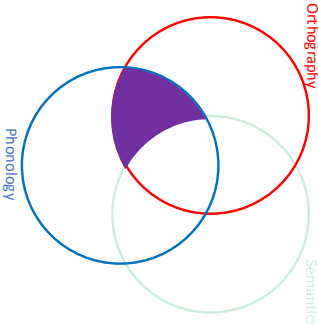
- Shall we promote the metalinguistic awareness so that the reading performance will be promoted?
- Shall we directly work on reading instead?
- More like “chicken and egg” ...



Accelerating Reading Abilities (ARA)



- Orthography – Phonology



Regularity

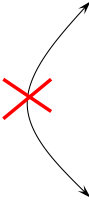


“Rule-based” treatment in Chinese



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 攜手邁向大 - 共創非凡

Regularity	Character	Phonetic radical
Regular	琪 /k ^h ei ₂₁ /	其 /k ^h ei ₂₁ /
Irregular	組 /tsou ₃₅ /	目 /ts ^h ei ₃₅ /



Consistency



Consistency	Phonetic	Characters
Consistent	冒	聽 /kʏŋ⁵⁵/ 娟 /kʏŋ⁵⁵/ 涓 /kʏŋ⁵⁵/ 捐 /kʏŋ⁵⁵/
Inconsistent	艮	根 /kaŋ⁵⁵/ 眼 /ŋaŋ²³/ 很 /hɛŋ³⁵/ 限 /haŋ²²/

Con't



	Regularity	Consistency
返	反 Regular	返 Inconsistent 販 Inconsistent 板 Inconsistent
鈉	內 Irregular	鈉 Consistent 呐 Consistent 納 Consistent

Regularity x Consistency



	Regularity	Consistency
蝗	皇 Regular	蝗 蝗 蝗 凰 Consistent
粗	且 Irregular	粗 祖 咀 姐 Inconsistent

ARA



- Hypothesis
 - Children failed in reading acquisition because they are not able to establish the metalinguistic awareness of reading
- Goal of treatment
 - To assist the client to establish the metalinguistic awareness of reading

Targeted metalinguistic awareness



- The awareness of regularity
- The awareness of consistency
- The character awareness (morphological awareness)

Con't



- Stage 2
 - To aware of the existence of irregularity
 - To establish the awareness of consistency
- Stimuli
 - Irregular but consistent (IRC) characters

Three treatment stages



- Stage 1
 - To establish the awareness of regularity
- Stimuli
 - Regular and consistent (RC) characters

Con't



- Stage 3
 - To aware of the existence of inconsistency
 - To flexibly use the regularity rule and the consistency rule
- Stimuli
 - Irregular but consistent (IRC) characters, regular but inconsistent (RIC) characters and irregular and inconsistent (IRIC) characters



- Implicit instructions
- “Regularity” principle
 - High frequency of occurrence of the treatment targets with high consistency in the language input
 - One type of characters in each stage
- “Variability” principle
 - The use of varied elements in association with the treatment target in the presentation of language input
 - Twelve pairs of targets in each session

Probe test



- Tailor-made to track the reading strategies used by each client
- Administered at:
 - The assessment session
 - The end of each treatment session
 - The post-TX assessment session

Con't

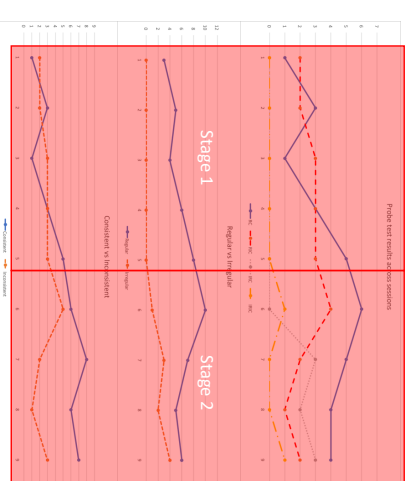


- Contains:
 - 6 low freq RC characters
 - 6 low freq RIC characters
 - 6 low freq IRC characters
 - 6 low freq IIRC characters
 - 6 phonetic radicals
 - 6 treatment targets
- The first 4 types of characters are matched for average frequencies

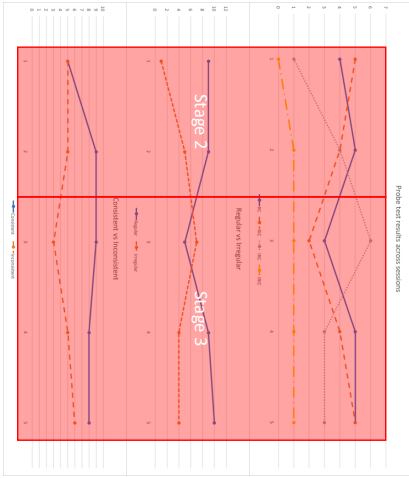
Case illustration



- Case 1: CKL



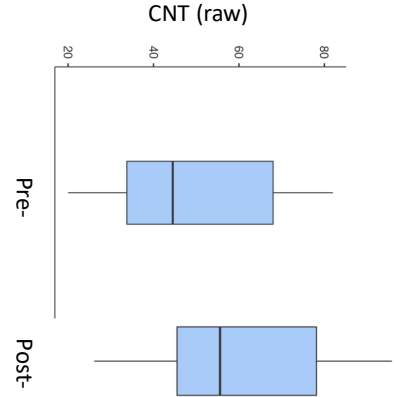
Case 2: WCK



Empirical data



- Results of paired t-test: $t(19) = 7.64, p < .001$



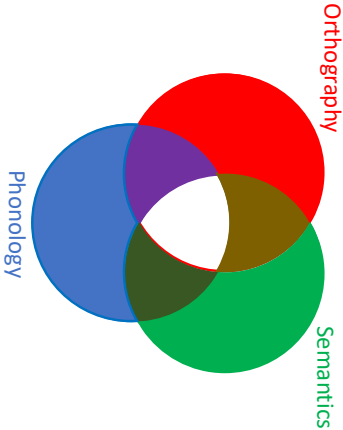
Leung et al. (in preparation)

Summary



We are PolyU - Together We Excel
我們是港大 - 齊心創卓越

The triangle model as a framework to guide Ax and Tx





- It's all about language
- Any concepts applied in oral language assessment and treatment are applicable in written language disorders as well!

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