

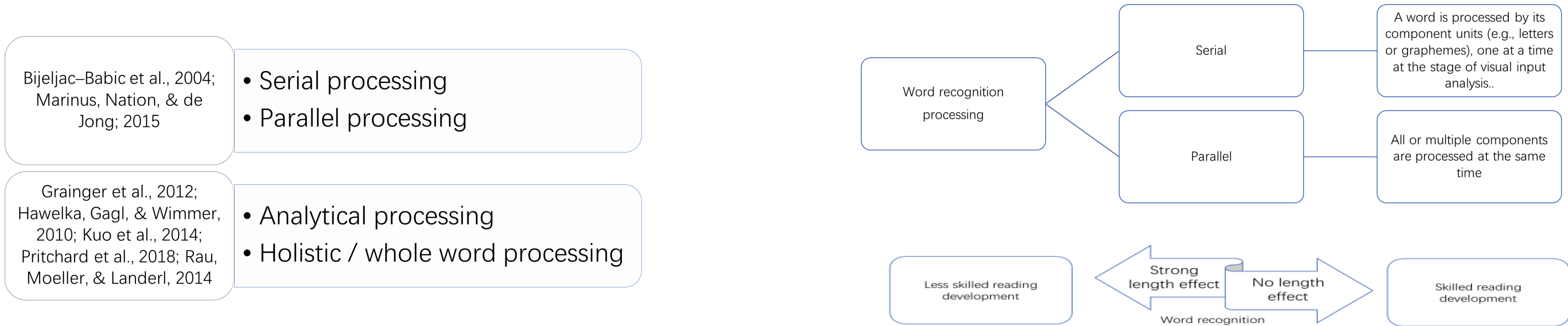
Analytical VS. Holistic Processing in Visual Word Recognition in L2

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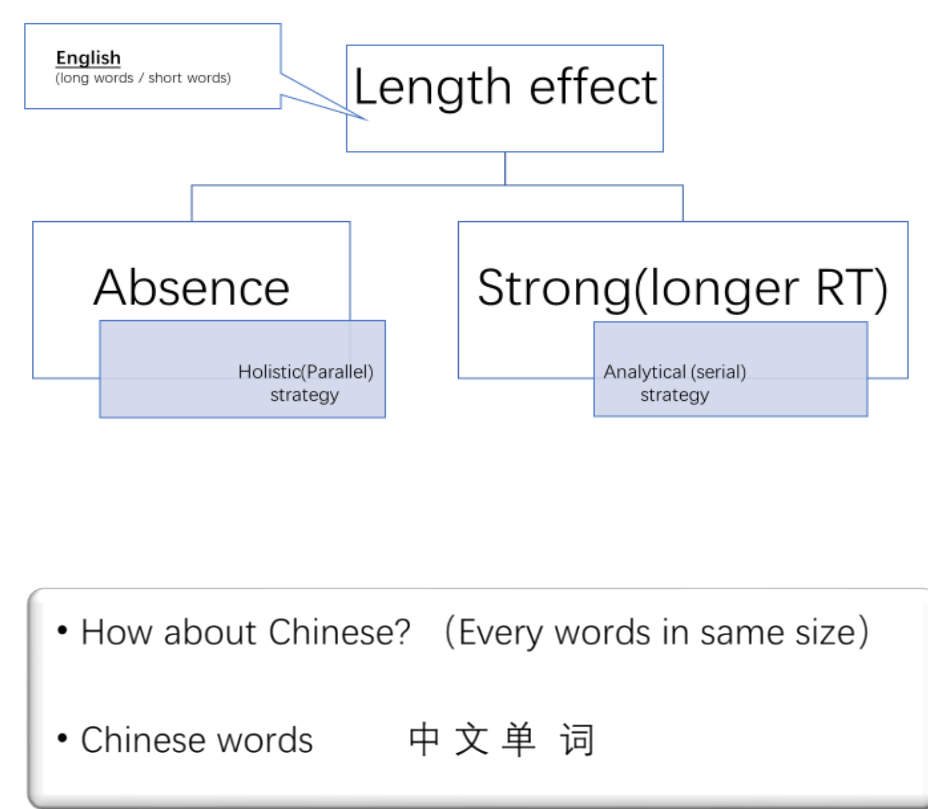
BACKGROUND

- Many researchers studied 2 processing strategies of word recognition which were often regarded as indication of reading development.
- Limited researches examined the role of sub-lexical units (letters /strokes) in second language word recognition and stroke-number effect in a logographic language(e.g. Chinese).
- The findings were not quite consistent on the stroke-number effect in Chinese word recognition.
- Some research found the stroke-number in reaction time(RT) and/or error rate (ER) in a variety of tasks (naming, lexical decision, word identification)



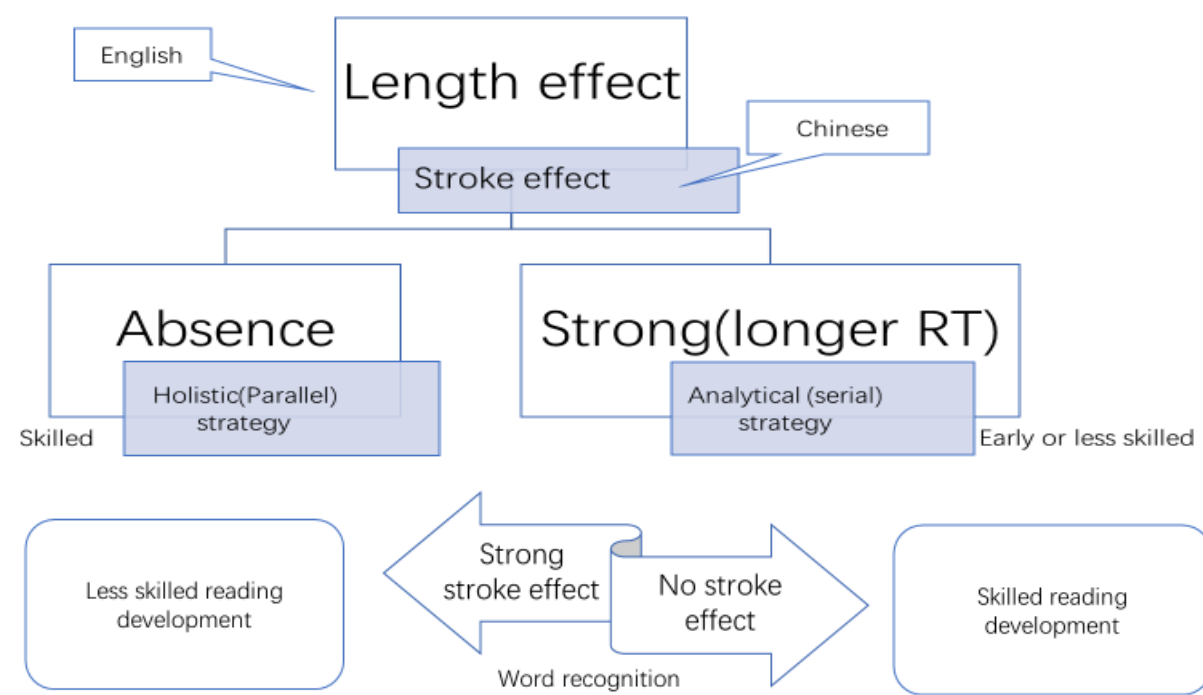
INTRODUCTION

- OBJECTIVES:** to introduce the use of analytic versus holistic character recognition strategies in the second language (L2) learners(Jiang,2020, 2022)
- Serial (or analytic) and parallel (or holistic) visual word recognition strategies in alphabetic languages (English):** tested through the word length effect.
 - The length effect refers to a longer reaction time (RT)—(a higher error rate)—while responding to longer words(Jiang,2022).
 - A length effect/a stronger length effect: indicating serial processing
 - the absence of or smaller length effects : indicating parallel processing
 - Serial (analytic)processing: adopted by less skilled learner
 - Parallel(holistic) processing: adopted by more skilled learners
- The issue of **serial versus parallel processing of word is rarely explored, especially in learners of Chinese as a second language (CSL)** .



ASSUMPTIONS

- Strokes in Chinese might be considered as component units of a word** (similar to letters), so the number of strokes may be employed as indicator (just like length of words in English) influencing visual word recognition.
- Nan Jiang** proposed a stroke-number effect (i.e., a longer RT for words of more strokes) just like the length effect indicating the type of processing strategies learners of different levels adopted.
- No stroke-number effect might imply a parallel or holistic strategy while a robust stroke number effect might be regarded as indicator of a serial or analytical processing strategy.



METHODS

Lexical Decision Task for learners of Chinese as a second language (CSL) and Chinese native speakers (NSs) (Jiang, 2022)

PARTICIPANTS

- 34 CSL participants:** 16 undergraduate and 18 graduate students studying at a Chinese university.
 - From 4 universities in Beijing.
 - From 10 different native language backgrounds, including Thai (n = 8), Vietnamese (n = 5), Cambodian (n = 5), Russian (n = 5), Indonesian (n = 4), French (n = 3), Korean (n = 3), Laos (n = 1).
 - Studied the Chinese language for a mean length of 4.1 years (2–9 years). Their mean self-rating scores (on a 1–10 scale) of Chinese proficiencies for listening, speaking, reading, and writing were 7.4, 7.1, 6.9, and 6.4, respectively.
- 46 Chinese NS participants:** 3rd year and 4th year undergraduate students in 2 Chinese universities.
- They were all paid for their participation.**

PROCEDURE

- Participants examined **individually**.
- In the Lexical Decision Task**, participants need **press the right-shift key if it is a character they know** and they **should press the left-shift key** if they do not know the character.
- Required to complete the task as **quickly and accurately** as possible.
- 8 practice trials** before the experimental ones.
- Each trial included an asterisk serving as a fixation point, and then **a stimulus would be displayed for 500 ms**.
- Lasted around **15 minutes**.
- DMDX developed by Forster and Forster's (2003) was employed for stimulus display and data collection.

RESULTS

TABLE 1 Chinese NS and CSL speakers' mean RT (in millisecond) and ER (in percentage) and standard deviations (in parentheses) for characters and noncharacters

	NS (n = 40)		CSL (n = 32)	
	RT	ER	RT	ER
Characters	505 (21.8)	1.32 (1.85)	648 (56.0)	1.19 (2.07)
Noncharacters	659 (50.7)	7.81 (9.18)	903 (150.2)	10.18 (14.61)
Difference	154	6.46	255	8.99

Abbreviations: CLS, Chinese as a second language; ER, error rates; NS, native speakers; RT, reaction times.

TABLE 2 The results of generalized additive regression analyses of RT and ER data for words and nonwords from NS and CSL participants

		edf	Ref. df	F	p Value
<i>RT</i>					
NS, words	s (stroke)	1	1	2.785	.098
	$R^2(\text{adj}) = .016$; deviance explained = 2.51%				
NS, nonwords	s (stroke)	6.949	7.982	3.216	.00247
	$R^2(\text{adj}) = .177$; deviance explained = 23.3%				
CSL, words	s (stroke)	1	1	13.27	.00041
	$R^2(\text{adj}) = .101$; deviance explained = 10.9%				
CSL, nonwords	s (stroke)	2.165	2.742	8.562	1e-04
	$R^2(\text{adj}) = .182$; deviance explained = 20.0%				
<i>ER</i>					
NS, words	s (stroke)	1	1	0.479	.49
	$R^2(\text{adj}) = -.004$; deviance explained = 0.441%				
NS, nonwords	s (stroke)	6.788	7.847	1.661	.111
	$R^2(\text{adj}) = .082$; deviance explained = 14.4%				
CSL, words	s (stroke)	1	1	2.166	.144
	$R^2(\text{adj}) = .010$; deviance explained = 1.97%				
CSL, nonwords	s (stroke)	1.23	1.427	1.588	.276
	$R^2(\text{adj}) = .009$; deviance explained = 2.14%				

Abbreviations: CLS, Chinese as a second language; ER, error rates; NS, native speakers; RT, reaction times.

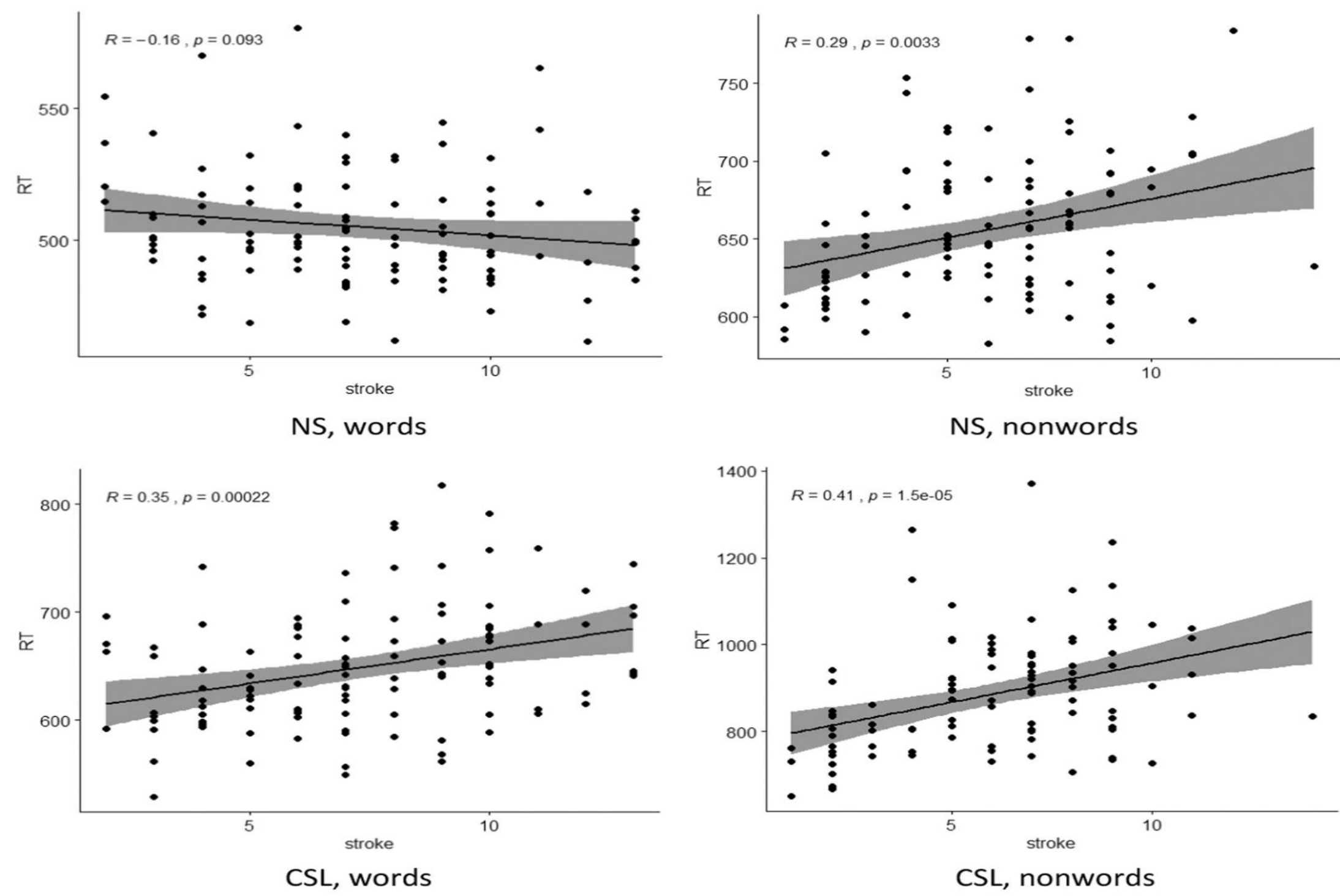


FIGURE 1 Native speakers and Chinese as a second language participants' reaction time for word and nonword items of different strokes

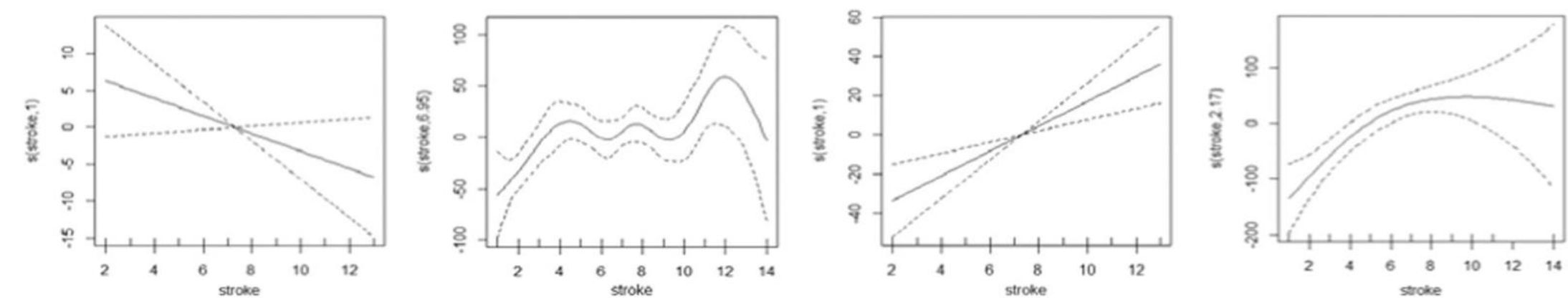


FIGURE 2 The linearity of the relation between stroke number and reaction time for characters and noncharacters among native speakers and Chinese as a second language participants

DISCUSSION

NanJiang's study examined serial or analytic character recognition among L2 speakers by experiments of the stroke number effect among CSL speakers. 3 main findings in the study.

- There's a **stroke number effect for nonwords** but not for characters in the group of **Chinese NS**.
- There's a **stroke number effect for both words and nonwords** among **CSL speakers**.
- There's a linear relation between stroke number and RT for word items.

NS (skilled learner)	CSL(early/less-skilled learner)
• Nonwords	• words • Nonwords

CONCLUSION

- Findings in Nan Jiang's study provide evidences for analytic word recognition among L2 speakers as well as some theoretical and pedagogical issues for future research.
- NS probably processed familiar characters holistically and more analytically for noncharacters.
- CSL learner showed a stroke-effect for both characters and noncharacters which implied that CSL speakers might process both characters and noncharacters analytically.
- The findings of Nan Jiang's study (Jiang et al. (2022, 2020) revealed CSL employed serial or analytic processing strategy in L2 word recognition.
- CSL learners may not be able to develop a holistic word recognition strategy by themselves only relying on increasing learning experience of the language. Teachers and textbook need provide aids to help them.

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