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Online Application of Principle C in L2 Pronoun Resolution: Evidence from Self-Paced Reading

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ABSTRACT

The Journal of Studies in Language 35.1, 085-095. This study reports the results from a self-paced reading experiment that investigates Korean-English second language (L2) speakers' online sensitivity to Principle C on online pronoun resolution. I examine this in the context of strong crossover (SCO) configurations in English to explore the effects of first language (L1) and proficiency on L2 processing. The findings show that proficiency appears to predict Korean-English L2 speakers' use of target grammatical knowledge online. Highly-proficient Korean-English L2 speakers demonstrate sensitivity to the SCO constraint during online pronoun resolution in that they do not consider a fronted wh-phrase as a potential antecedent for a gender-matched pronoun that intervenes the wh-phrase and its gap. However, the SCO constraint does not restrict less-proficient Korean-English L2 speakers' online pronoun resolution. The findings also suggest that L1 is not a determinant factor in L2 processing; that is to say, L2 processing is not fundamentally different from L1 processing. **(Korea University)**

Keywords: L2 processing, self-paced reading, wh-questions, strong crossover, Principle C

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1. Introduction

A key question about second language (L2) processing lies in whether it utilises grammatical knowledge in the same way as first language (L1) processing (Clashen and Felser, 2006; Dekydtspotter, Schwartz, and Sprouse, 2006; Roberts, 2016). The debate is sparked off by Shallow Structure Hypothesis (SSH; Clahsen and Felser, 2006). The SSH predicts that L2 speakers do not employ abstract grammatical knowledge when parsing the target structures; instead, their processing mechanism heavily relies on lexical, semantic, or pragmatic information. The SSH also precludes the role of L1 as well as L2 proficiency with respect to processing resources available to L2 speakers. In other words, the difference between L1 and L2 processing cannot be attributed to L2 speakers' L1s or proficiency since L2 processing is fundamentally different from L1 processing

in the sense of Bley-Vroman (1990) and Clahsen and Muysken (1989). L2 speakers are, after all, to be shallow parsers for Clahsen and Felser (2006).

I investigate this in the context of strong crossover (SCO) configurations in English, such as (1a), where a wh-word has moved across a pronoun (Postal, 1971; Wasow, 1972).

(1) a. Who$_i$ does he$_{*i/j}$ think Yengmi loves t_i ?
b. Who$_i$ t_i thinks Yengmi loves him$_{i/j?}$

The interpretation of the SCO configuration in (1a) contrasts with the non-strong crossover (NSCO) configuration (1b). In (1a), the pronoun *he* must refer to an extra-sentential antecedent, whereas in (1b), the pronoun *him* can refer to the fronted wh-word. This contrast is argued to be due to the syntactic relationship between the pronoun and the wh-trace; In (1a), but not in (1b), the pronoun c-commands the wh-trace violating Principle C of the Binding Theory (Chomsky, 1981).

Processing of SCO configurations requires two structural dependencies: wh-dependency and referential dependency. In other words, the parser must associate a wh-dependency that is forward process to locate the wh-word's gap with a referential dependency that is backward process to search for a potential antecedent that was already processed (Fraizer, Ackerman, Baumann, Potter and Yoshida, 2015). This is evidenced in a self-paced reading study by Kush (2013), which reports that native speakers of English consider a wh-filler as an antecedent for a pronoun in NSCO configurations, but not in SCO configurations.

However, the contrast between the SCO and NSCO question in (1) may pose a potential parsing problem for L2 speakers of wh-in-situ languages such as Korean that do not exhibit a wh-filler-gap dependency. In Korean, for example, no SCO effect is observed; rather, it is independently observed that an overt pronoun cannot be construed as a variable bound by a wh-word (Hong, 1985; see also Montalbetti, 1984).

(2) a. Ku$_{*i/j}$-nun Yengmi-ka nwukwu$_i$-lul salanghan-ta-ko sayngkakha-ni?
he-TOP Yengmi-NOM who-ACC love-DEC-COM think-Q
'Who does he think Yengmi loves?'
b. Nwu(kwu)$_i$-ka Yengmi-ka ku$_{*i/j}$-lul slanghan-ta-ko sayngkakha-ni?
who-NOM Yengmi-NOM he-ACC love-DEC-COM think-Q
'Who thinks Yengmi loves him?'

The question then arises as to whether Korean speain the sense of Bley-Vroman (1990) and Clahsen and Muysken (1989). L2 speakers are, after all, to be shallow parsers for Clahsen and Felser (2006).kers of English are able to apply Principle C during the search for an antecedent for a pronoun in SCO configurations. That is to say, due to the SCO effect, the parser must ignore the wh-word as a potential antecedent. If Korean speakers of English have developed target grammatical knowledge (i.e. wh-movement), they will demonstrate target-like processing patterns as native speakers of English. If, on the other hand, Korean speakers of English have not constructed target grammatical knowledge, they will demonstrate non-target-like processing patterns as predicted by the SSH.

The aim of the current experimental study is to investigate whether Korean-English L2 speakers are sensitive to the SCO constraint during online pronoun resolution. By doing so, this study contributes to identifying the role of L1 and proficiency in L2 processing.

I begin below by briefly discussing theoretical accounts of the SCO phenomenon and previous online studies on wh-filler-gap dependencies.

2. Background

2.1 Principle C account of strong crossover

Chomsky (1981), building on Wasow (1972), proposes that the SCO effect is reduced to the Binding Principle C, assuming that a trace left by wh-movement functions as an R-expression; R-expressions must obey the Binding Principle C.

(3) Binding Principle C
An R-expression is free.

(Chomsky, 1981: 188)

(4) Binding
α is X-bound by β if and only if α and β are coindexed, β c-commands α, and β is in an X-position. α is X-free if and only if it is not X-bound.

(Chomsky, 1981: 184-185)

(5) C-command
Node A c(constituent)-commands node B if neither A nor B dominates the other and the first branching node which dominates A dominates B.

(Reinhart, 1976: 32)

What is entailed through (3)-(5) is that the c-command relation is a necessary requirement for the binding relationship, and so binding must be applied in terms of A-binding, not Ā-binding; that is, a binder is an NP in an A-position, not in an Ā-position. Thus, a wh-trace cannot be A-bound by an NP that has the same index. Then it may be useful to see how Principle C accounts for the contrast between the SCO configuration (6a) and the NSCO configuration (6b).

(6) a. Who_i does $\text{he}_{*i/j}$ think Yengmi loves t_i ?
b. Who_i t_i thinks Yengmi loves $\text{him}_{i/j}$?

In (6a), the wh-trace is not free since it is c-commanded by the pronoun *he* that has the same index, violating Principle C. In (6b), on the other hand, the wh-trace c-commands the pronoun *him*, and so the coreferential interpretation is available on the basis of Reinhart's Generalisation, which states that "pronoun binding can only take place from a c-commanding A-position" (Büring, 2004: 24).

2.2 L2 Processing of wh-filler-gap dependencies

Some studies on wh-filler-gap dependencies reveal that L2 speakers do not make use of syntactic information during online processing, lending support to the SSH. For example, Marinis, Robert, Felser, and Clahsen (2005) investigated, using a self-paced reading task, processing of wh-filler-gap identification at each trace position in (7) with advanced L2 speakers of English with wh-ex-situ (German and Greek) and wh-in-situ languages (Chinese and Japanese).

(7) a. The nurse who$_i$ the doctor argued t_i that the rude patient had angered t_i is refusing to work late.
b. The nurse who$_i$ the doctor's argument about the rude patient had angered t_i is refusing to work late.

In (7), the wh-filler-gap identification is resolved after the verb *angered*. In (7a), for example, the wh-filler-gap identification can be facilitated by the intermediate gap after the verb *argued*. In (7b), on the other hand, due to the absence of the intermediate gap, the wh-filler-gap identification would be delayed since the parser must process all of the elements between the wh-filler and the gap. A reading time slowdown is then expected after the verb *angered* in (7b), but not in (7a). The results confirm that a facilitation effect is available for the native controls, but not for the L2 groups, regardless of their L1s. Marinis et al. (2005) conclude that the L2 speakers' use of syntactic information during online processing is restricted to that of native speakers.

However, other studies on processing of wh-filler-gap dependencies reveal the opposite results. For example, Aldwayan, Fiorentino, and Gabriele (2010) investigated, using a self-paced reading task, whether the wh-filler-gap identification is resolved in an island with advanced Najdi Arabic speakers of English whose L1 is a wh-in-situ language.

(8) a. My sister wondered if the boring comments about John's used car were intended to entertain the group.
b. My sister wondered who$_i$ the boring comments about John's used car were intended to entertain t_i.

In (8b), a complex noun phrase *the boring comments about John's used car* constitutes a complex NP island for movement of *who*, and there are two potential gaps: after the preposition *about* and after the verb *entertain*, which is not the case in (8a). If L2 speakers do not respect the island constraint, the wh-filler-gap identification is then resolved after the preposition *about*; consequently, a reading time slowdown is expected at *John's*. The results show that no slowdown is observed at *John's* for both L1 and L2 speakers of English. Aldwayan et al. (2010) conclude that L2 speakers make use of syntactic information during online processing.

3. Experiment

The current experimental study explores how Korean-English L2 speakers analyse SCO configurations online, where a wh-phrase can be a potential antecedent for a pronoun. Based on the SSH and the previous studies, I take into consideration the role of L1 transfer and L2 proficiency in processing of SCO configurations in English. The following research questions are then formulated:

- Do Korean speakers utilise target syntactic knowledge during online processing of strong crossover configurations in English?
- Does the L1 influence online processing of strong crossover configurations in English?
- Does L2 proficiency affect online processing of strong crossover configurations in English?

3.1 Participants

51 1 participants participated in the experiment: 32 Korean speakers of English and 19 native speakers of British English. As for the Korean speakers, they were native speakers of Korean. At the time of testing, 29 were enrolled in either undergraduate or postgraduate programmes at UK universities; the other three were working professionals, living in the UK and had postgraduate degrees from UK universities. As for the English speakers, they were native speakers of British English. At the time of testing, they were enrolled in either undergraduate or postgraduate programmes at UK universities and served as a control group. Detailed participant information is provided in Table 1.

Table 1. Summary of participants' background information

	Age		Gender		*OE*		*LOR*	
Group	M	Range	Male	Female	M	Range	M	Range
Korean (n = 32)	33.1	18-52	11	21	11.4	7-14	3.1	0.9-16
English (n = 19)	23.9	20-41	14	5	N/A	N/A	N/A	N/A

Note. OE = onset of English learning in year; *LOR* = length of residence in English-speaking countries in year.

On the basis of their performance on the Quick Placement Test (QPT; Oxford University Press, 2001), Korean speakers were further divided into two subgroups: intermediate and advanced group.[1)] Detailed results of the proficiency test are summarised in Table 2.

Table 2. Mean scores on the QPT

			95% CI			
Group	*M*	*SD*	*LB*	*UB*	Min	Max
Advanced (n = 10)	52.3	3.4	49.9	54.7	48	57
Intermediate (n = 22)	42.4	2.3	41.4	43.4	38	46

Note. CI = confidence interval; *LB* = lower bound; *UB* = upper bound.

The data in Table 2 show that the advanced group (mean score = 52.3) achieved relatively a higher level of competence than the intermediate group (mean score = 42.4). An independent-samples *t*-test confirms that the advanced group's proficiency differs significantly from the intermediate group's, $t(30) = -9.63$, $p = .000$.

1) Proficiency levels, corresponding to the Common European Framework Reference, were determined by the following score ranges: elementary (18-29 out of 60); intermediate (30-39 out of 60); upper intermediate (40-47 out of 60); lower advanced (48-54 out of 60); upper advanced (55-60 out of 60).

3.2 Materials

A self-paced reading task was designed for data collection. 16 experimental items were constructed and manipulated by two factors, yielding four conditions: gender congruency between the wh-phrase and the pronoun (match vs. mismatch) and extraction position of the wh-phrase (SCO vs. NSCO). Target stimuli are illustrated in (9).

(9) a. Strong crossover with gender match
Which waitress did the busboy say she had blamed for slow service?
b. Strong crossover with gender mismatch
Which princess did the queen say he had insulted at the reception?
c. Non-strong crossover with gender match
Which salesman said the chairwoman had flattered him on talents for sales?
d. Non-strong crossover with gender mismatch
Which monk said the knight had followed her into the old Cathedral?

In the SCO condition, the wh-phrase matches the pronoun in gender, resulting in the SCO effect, as in (9a) or it mismatches the pronoun in gender, causing a gender-mismatch effect, as in (9b) (van Gompel and Liversedge, 2003). The matrix subject, which is structurally accessible, always mismatches the pronoun in gender. By removing the matrix subject as a potential antecedent for the pronoun, the parser does not observe any referential dependency between the matrix subject and the pronoun. This was done to establish whether Korean speakers of English make use of the target syntactic knowledge in processing of SCO constructions. In (9a), for example, the parser has to link the wh-phrase that matches the pronoun in gender but is structurally inaccessible as a possible antecedent. This consequently will lead to processing difficulty since there is no structurally accessible antecedent. Thus, a possible slowdown is expected at the pronoun or after the pronoun during online processing if the parser obeys the SCO constraint. If not, then no slowdown is expected at the pronoun or after the pronoun. This would indicate absence of target-like syntactic representation of wh-movement. In addition to this, a gender-mismatch effect is expected in (9b) since there is no accessible antecedent for the pronoun. This will also lead to processing difficulty, and so a possible slowdown is expected at the pronoun or after the pronoun. Consequently, no reading time difference is expected at the regions of interest during online processing of SCO configurations.

In the NSCO condition, on the other hand, the wh-phrase matches the pronoun in gender, resulting in coreferential interpretation, as in (9c) or it mismatches the pronoun in gender, yielding a gender-mismatch effect, as in (9d). The embedded subject always mismatches the pronoun in gender to remove it as a potential antecedent. This was done to ensure that the parser do not engage in any referential dependency between the embedded subject and the pronoun. In (9c), no slowdown is predicted at the pronoun or after the pronoun since both wh-dependency and referential dependency are facilitated by processing. That is to say, the wh-phrase must be processed before the pronoun. In (9d), by contrast, a possible slowdown is expected at the pronoun or after the pronoun as there is no antecedent that matches the pronoun in gender. Thus, a reading time difference is expected at the regions of interest during online processing of NSCO configurations.

In addition to the target stimuli, there were 16 fillers to mask the test sentences, giving a total of 32 items. The filler items were all declarative sentences, sharing similar factors with the experimental items: gender match/mismatch between a pronoun and a matrix/embedded subject. Half of the items, including the fillers, were followed by yes/no comprehension questions (see Jegerski, 2012 for discussion on comprehension questions).

3.2 Procedure

The experiment was run on a laptop PC, using PsychoPy (Pierce, 2007). Each item was presented in a centre noncumulative format with word-by-word segmentation. Participants were able to read a sentence one word at a time, by pressing the space bar on the keyboard. Each press of the space bar disclosed a new word, and at the same time the previous word disappeared from the screen. Participants were instructed to read each sentence at their own speed for comprehension. Before beginning the experiment, participants were given a list of vocabulary used in the experiment materials to avoid the issue of lexical access (Marinis, 2010). That is, problems with unfamiliar words may result in slow reading times during L2 processing, which may mask L2 speakers' syntactic parsing during comprehension on target items. Participants were also given four practice items in order to familiarise them with the task prior to the actual task. All participants were tested individually.

4. Results and Discussion

Prior to the data analysis, reading times (RT) that were below 200ms or above 6000ms were eliminated. Furthermore, RTs that were 2.5 standard deviations below or above the group mean were also removed. This affected less than 3% of the trial in each group. Participants were also screened based on comprehension question accuracy; participants whose comprehension question accuracy that was below 2.5 standard deviations from the mean were removed from the data analysis. Due to the outlying participants, one native control and two intermediate Korean speakers were excluded. Thus data from 18 native controls, 10 Korean advanced, and 20 Korean intermediate entered into the data analysis. Table 3 provides mean comprehension question accuracy between the groups.

Table 3. Mean comprehension question accuracy

	SCO				NSCO			
			95% CI				95% CI	
Group[a]	*M*	*SD*	*LB*	*UB*	*M*	*SD*	*LB*	*UB*
NC	72%	23	60%	84%	81%	23	69%	92%
KA	63%	18	50%	75%	78%	25	60%	95%
KI	55%	22	44%	65%	64%	17	56%	72%

Note. [a]NC = native control (n = 18); KA = Korean advanced (n = 10); KI = Korean intermediate (n = 20). CI = confidence interval; *LB* = lower bound; *UB* = upper bound.

The data in Table 3 show that SCO questions were relatively less accurate on average than NSCO questions, indicating that the SCO effect elevated computational burden; however, accuracy did not differ significantly across

conditions ($p < .05$). This pattern of accuracy confirms that Korean speakers are sensitive to SCO and NSCO configurations in English.

Turning to the self-paced reading results, Repeated Measures (RM) ANOVAs were conducted on the regions of interest with congruency (gender match vs. gender mismatch) and constraint (SCO vs. NSCO) as within-subject variables, and group (native control, Korean advanced, and Korean intermediate) as a between-subjects factor. The RM ANOVA revealed a three-way interaction between congruency, constraint and group for the two regions of interest: for the pronoun, $F(2, 45) = 3.45$, $p = .04$ and for the post-pronoun, $F(2, 45) = 4.39$, $p = .018$.

Consider first SCO configurations where a slowdown is expected at the regions of interest, regardless of gender congruency. The relevant data are given in Table 4.

Table 4. Mean reading times in milliseconds in SCO questions

		Regions of interest		
Group[a]	Condition	Pre-pronoun	Pronoun	Post-pronoun
NC	Gender match	608	567	644
	Gender mismatch	589	699	640
KA	Gender match	965	784	919
	Gender mismatch	843	994	1007
KI	Gender match	879	773	569
	Gender mismatch	980	921	668

Note. [a]NC = native control (n = 18); KA = Korean advanced (n = 10); KI = Korean intermediate (n = 20).

In the gender-match condition, the native speakers appear not to link the gender-matched wh-phrase to the pronoun due to the SCO effect. This is manifested at the post-pronoun with a slowdown of 77ms. The advanced speakers also demonstrate a slowdown of 135ms at the post-pronoun, which indicates that they are sensitive to the SCO constraint during online pronoun resolution. In other words, they construct the wh-filler-gap dependency actively upon reading the wh-phrase (Clifton and Frazier, 1989), and the referential dependency upon encountering the pronoun (Fraizer et al., 2015). The advanced speakers, patterning with the native speakers, appear to build the target structure incrementally. That is, their grammar involves genuine wh-movement, displaying sensitivity to the c-command relation between the pronoun and the wh-trace. This in turn suggests that the advanced speakers are indeed able to make use of abstract grammatical knowledge online. By contrast, the intermediate speakers appear not to respect the SCO constraint; their reading times start to decrease from the pronoun region. It is likely that the intermediate speakers' parsing mechanism do not involve incremental structure building.

In the gender-mismatch condition, the native speakers show a slowdown of 110ms at the pronoun due to the gender-mismatch effect. The advanced speakers appear to have a similar processing pattern as found in the native speakers, showing the gender-mismatch effect at the pronoun; a slowdown of 151ms at the pronoun is observed. In other words, the advanced speakers do not consider the wh-phrase that mismatches in gender as a potential antecedent, which in turn implicates active search for the antecedent for a pronoun. However, the intermediate speakers do not slow down at the pronoun or at the post pronoun, suggesting that their processing mechanisms is different from those of the

native speakers as well as the advanced speakers.

As predicted in Section 3.2, no reading time difference should be found at the regions of interest in the SCO condition if the SCO constraint is activated during online processing; that is, no difference in RTs is expected between the regions where slowdowns occurred. As for the control group, a paired samples *t*-test confirms that no significant difference is found between the RT at the pronoun in the gender-mismatch condition (699ms) and the RT at the post-pronoun in the gender-match condition (644ms) ($p < .05$). When it comes to the advanced group, a paired samples *t*-test shows no significant difference between the RT at the pronoun in the gender-mismatch condition (994ms) and the RT at the post-pronoun in the gender-match condition (919ms) ($p < .05$).

Consider next NSCO configurations where the difference in reading times is expected at the regions of interest due to gender congruency (match vs. mismatch). The relevant data are given in Table 5.

Table 5. Mean reading times in milliseconds in NSCO questions

		Regions of interest		
Group[a]	Condition	Pre-pronoun	Pronoun	Post-pronoun
NC	Gender match	534	604	498
	Gender mismatch	544	691	724
KA	Gender match	898	688	601
	Gender mismatch	955	1150	729
KI	Gender match	947	771	616
	Gender mismatch	976	926	688

Note. [a]NC = native control (n = 18); KA = Korean advanced (n = 10); KI = Korean intermediate (n = 20).

In the NSCO condition, as expected, both the native and advanced speakers appear to be sensitive to the gender-mismatch effect. In the gender-match condition, the native speakers display a decrease of 106ms at the post-pronoun while in the gender-mismatch condition, they show an increase of 146ms at the pronoun, and it is spilled over into the post-pronoun. The advanced speakers also demonstrate a decrease of 201ms at the pronoun in the gender-match condition whereas in the gender-mismatch condition, they show an increase of 195ms at the pronoun. This further supports the claim that the advanced speakers' grammar contains target-like representation of wh-movement, thus making use of it online.

The intermediate speakers, on the other hand, appear not to be sensitive to the gender-mismatch effect in reading NSCO questions; they do not slow down at the pronoun or at the post-pronoun, as in the gender-match condition. A similar processing pattern is also observed in the SCO condition. It is likely that the intermediate speakers parse NSCO questions as they do with SCO questions; their grammar appears to involve different syntactic representation of wh-movement.

To confirm that the gender-mismatch effect is operative in the NC and KA group, paired samples *t*-tests were employed (see Section 3.2). As for the control group, the paired samples *t*-test conducted on the RTs at the post-pronoun reveals a significant difference between the gender-mismatch condition (724ms) and the gender-match condition (498ms), $t(47) = 4.53$, $p = .000$. As far as the advanced group is concerned, the paired samples *t*-test conducted on the

RTs at the pronoun indicates a significant difference between the gender-mismatch condition (1150ms) and the gender-match condition (688ms), $t(9) = 2.95$, $p = .016$.

Taken together, the results suggest that the native speakers consider the fronted wh-phrase as a potential antecedent for the pronoun in NSCO configurations, but not in SCO configurations. The local antecedent search is constrained by the SCO effect during online processing. Similarly, the advanced speakers, patterning with the native speakers, respect the SCO constraint during online pronoun resolution. This can be explained by the assumption that advanced L2 speakers' grammar involves genuine wh-movement, thus respecting the SCO constraint during online pronoun resolution. L1 does not seem to be the main determinant of L2 processing. And yet it is likely that proficiency affects L2 processing. The intermediate speakers do not make use of the structurally-based filler-gap strategy online. This can be explained by the hypothesis that the intermediate speakers' grammar does not involve genuine wh-movement; rather, they may employ an L1-based option such as wh-scrambling in the sense of Bošković and Takahashi (1998). As a result of this, the intermediate speakers may experience difficulties distinguishing SCO questions from NSCO questions, thus showing no SCO effect during online pronoun resolution.

5. Concluding remarks

The findings from the current experimental study suggest that proficiency affects L2 processing. Highly-proficient L2 speakers, unlike less-proficient L2 speakers, are able to utilise target grammatical knowledge online. Also L1 has little influence online processing of the target language. L2 speakers of wh-in-situ languages may experience more processing load when parsing a wh-filler-gap assignment; however, this does not affect their use of the target grammar proper. Finally, the data suggest that L2 processing is not fundamentally different from L1 processing - it involves deep processing.

References

Aldwayan, S., R. Fiorentino, and A. Gabriele. 2010. Evidence of Syntactic Constraints in the Processing of Wh-movement: A Study of Najdi Arabic Learners of English. In B. Van Patten and J. Jegerski (eds.), *Research in Second Language Processing and Parsing*. Amsterdam, Netherlands: John Benjamins Publishing Company, 65-86.

Bley-Vroman, R. 1990. The Logical Problem of Foreign Language Learning. *Linguistic Analysis* 20, 3-49.

Bošković, Z. and D. Takahashi. 1998. Scrambling and Last Resort. *Linguistic Inquiry* 29, 347-366.

Büring, D. 2005. *Binding Theory*. Cambridge: Cambridge University Press.

Chomsky, N. 1981. *Lectures on Government and Binding*. Dordrecht: Foris.

Clahsen, H. and P. Muysken. 1989. The UG Paradox in L2 Acquisition. *Second Language Research* 5, 1-29.

Clahsen, H. and C. Felser, 2006. Grammatical Processing in Language Learners. *Applied Psycholinguistics* 27, 3-42.

Clifton, C. and L. Frazier. 1989. Comprehending Sentences with Long Distance Dependencies. In G. N. Carlson and M. Tanenhaus (eds.), *Linguistic Structure in Language Processing*. Boston: Kluwer Academic Publishers.

Dekydtspotter, L., B. Schwartz, and R. Sprouse. 2006. The Comparative Fallacy in L2 Processing Research. In M. G. O'Brien, C. Shea. and J. Archibald (eds.), *Proceedings of the 8th Generative Approaches to Second Language*

Acquisition Conference. Somerville, MA: Cascadilla Proceedings Project, 33-40.

Postal, P. 1971. *Crossover Phenomena*. New York: Holt, Rinehart and Winston, Inc.

Kush, D. 2013. *Respecting Relations: Memory Access and Antecedent Retrieval in Incremental Sentence Processing*. Doctoral Thesis. University of Maryland, College Park.

Frazier, M., L. Ackerman, P. Baumann, D. Potter, and M. Yoshida. 2015. Wh-filler-gap Dependency Formation Guides Reflexive Antecedent Search. *Frontiers in Psychology* 6. https://doi.org/10.3389/fpsyg.2015.01504

Hong, S. S. 1985. *A and Ā Binding in Korean and English: Government-Binding Parameters*. Doctoral Thesis. University of Connecticut.

Marinis, T. 2010. Using On-line Processing Methods in Language Acquisition Research. In E. Blom and S. Unsworth (eds.), *Language Learning and Language Teaching: Vol. 27. Experimental Methods in Language Acquisition Research*. Amsterdam, Netherlands: John Benjamins Publishing Company, 139-162.

Marinis, T., L. Roberts, C. Felser, and H. Clahsen. 2005. Gaps in Second Language Sentence Processing. *Studies in Second Language Acquisition* 27, 53-78.

Montalbetti, M. M. 1984. *After Binding: On the Interpretation of Pronouns*. Doctoral Thesis. Massachusetts Institute of Technology.

Peirce, J. W. 2007. Psychopy - psychophysics Software in Python. *J Neurosci Methods* 162, 8-13.

Reinhart, T. 1976. *The Syntactic Domain of Anaphora*. Doctoral Thesis. Massachusetts Institute of Technology.

Roberts, L. 2016. Self-paced Reading and L2 Grammatical Processing. In A. Mackey and E. Marsden (eds.), *Advancing Methodology and Practice: The IRIS Repository of Instruments for Research into Second Languages*. New York: Routledge, 58-73.

van Gompel, R. P. G., and S. P. Liversedge. 2003. The Influence of Morphological Information on Cataphoric Pronoun Assignment. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 29.1, 128-139.

VanPatten, B. and J. Jegerski. 2010. *Research in Second Language Processing and Parsing*. Amsterdam, Netherlands: John Benjamins Publishing Company.

Wasow, T. 1972. *Anaphoric Relations in English*. Doctoral Thesis. Massachusetts Institute of Technology.

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