Studies in English Language and Literature
Vol. 35, 1-17, February 2015

The Resolution of Pronouns and Reflexives in L2 English: L1 Influence and General L2 Effects

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Abstract

This study investigates whether and why advanced L2 speakers of English exhibit non-convergence in pronoun resolution with native English speakers, centering around two accounts: crosslinguistic influence from L1 and general L2 processing inefficiency. The study examined pronouns and reflexives in Picture Noun Phrases (PNPs, e.g. *Sheldon showed Leonard the picture of him/himself*) using a picture verification task. Reflexives in PNPs rely more heavily on structural constraints than non-structural constraints, whereas pronouns exhibit more evenly matched competition between structural and non-structural constraints (Kaiser et al., 2009). The results show that non-convergence in L2 ultimate attainment at interface structure (Sorace & Filiaci, 2006) such as PNPs is not due to interface *per se*. It is the presence or absence of the conflicts of different types of constraints that predicts whether or not there is non-convergence at interface structures. The interface provides the possibility of having conflicts of different types of information and various types of interface structures predict various degrees of non-convergence. Non-convergence in the reflexive conditions likely reflects crosslinguistic influence, whereas non-convergence in the pronoun conditions may reflect processing inefficiency as L2 speakers more generally. Crosslinguistic influence and processing inefficiency are not mutually exclusive at advanced stages in L2 acquisition.

Keywords: pronoun resolution, L2 acquisition, L1 influence, L2 processing

Acquiring a second language (L2) after childhood is challenging. It has been observed that even advanced L2 speakers may show non-convergence with native speakers in their comprehension of certain linguistic structures. One relevant question in the field of L2 acquisition is what type of structures is acquirable and what type of structures is more difficult to acquire to a native-like level. Another relevant question is why very advanced L2 speakers exhibit non-convergence with native speakers with regard to those more vulnerable structures – is it due to crosslinguistic influence from L1, or general L2 processing inefficiency?

Sorace and Filiaci (2006) proposed the Interface Hypothesis, which suggests that though very advanced L2 speakers seem able to acquire narrow syntactic properties of their L2, they have difficulties in structures involving an interface of syntax and other cognitive domains, such as semantics and pragmatics. In English, it is commonly assumed that the choice of referent for reflexive pronouns (e.g. *himself*) is specified by the syntactic/structural configuration of the sentence (Chomsky, 1981). The resolution of non-reflexive pronouns (e.g. *him*) relies more on non-structural factors such as semantic and discourse factors (Hobbs, 1979; Kehler, 2002). Thus, the Interface Hypothesis would predict that the resolution of reflexives is acquirable while the resolution of pronouns may be problematic for very advanced L2 speakers. However, it is difficult to identify structures involving exclusively syntactic properties. Many structures are sensitive to both structural and non-structural factors, and the differences among them tend to be gradient instead of categorical. One example is the Picture Noun Phrase (PNP, e.g. *Sheldon gave Leonard the picture of him*) in English. Kaiser, Runner, Sussman and Tanenhaus (2009) investigated PNP comprehension using a picture verification task and found that reflexives and pronouns exhibit different levels of sensitivity towards structural and non-structural constraints. PNPs provide a window to the interactions between structural and non-structural factors and how they affect pronoun resolution in L2.

This study aims to investigate whether and why advanced L2 speakers exhibit non-convergence with native speakers in pronoun resolution in English. To tease apart potential influence from L1 and general L2 processing problems, I tested L2 speakers of English from L1 backgrounds with different pronoun resolution preferences in PNPs. If it is crosslinguistic influence from L1, different patterns of non-convergence should be seen; if it is processing inefficiency, all L2 speakers are predicted to behave in a similar way and differently from native speakers.

Interfaces in Bilingual Language Development

The original version of the Interface Hypothesis (IH) (Sorace & Filiaci, 2006) proposed that language structures involving an interface between syntax and other cognitive domains are less likely to be fully acquired than structures involving only "narrow syntactic properties"(p.340) in L2 ultimate attainment. Later, Sorace and Serratrice (2009) identified internal interfaces which involves grammar-internal computations (e.g. syntax-semantics), and external interfaces which involves appropriateness in context (e.g. syntax-discourse). Sorace and Serratrice (2009) also suggested that internal interfaces seem acquirable in L2 and more vulnerable to crosslinguistic influence, while external interfaces are potentially problematic and are more vulnerable to processing costs. However, the distinction of internal and external interfaces is still too broad. Many structures do not necessarily fit neatly into the so-called internal or external interfaces. Instead of making categorical distinctions of interface structures, it is more reasonable to treat structures on a gradient basis—from more syntactically constrained to more contextually constrained. The present study aims to capture the subtle differences that occur at different interface conditions using the reflexives and pronouns in PNPs in more fine-grained conditions.

Regarding the root of non-convergence between advanced L2 speakers and native speakers, the accounts that have been proposed can be broadly grouped into 1) the representational account, which assumes that there are differences in L2 at the level of linguistic knowledge representations, in most circumstances due to crosslinguistic influence from L1; and 2) the processing account, which claims that non-convergence in near-native L2 speakers may be caused by general L2 processing problems in integrating multiple types of information in real time.

The representational account argues that for bilingual speakers who speak both null-subject (e.g. Italian) and non-null-subject languages (e.g. English), the pragmatic constraints controlling null and overt pronouns would be weakened in the null subject language due to the influence of the non-null subject language representations (Tsimpli, Sorace, Heycock & Filiaci, 2004). It has been documented that bilingual speakers who speak a null-subject language and a non-null-subject language tend to overuse overt pronouns in contexts where a null pronoun is more appropriate. Tsimpli et al. (2004) argued that the extension of overt pronouns is caused by underspecification of interpretable features (e.g. topic shift) whereby near-native speakers of English under L1 attrition map overt pronouns to contexts with and without a topic shift in their native null subject languages. This underspecification account can be extended to residual optionality in L2 acquisition (Belletti, Bennati & Sorace, 2007). The limitation of the underspecification account is that it only applies to bilingual speakers of certain language combinations,

one of which is more complex at the syntax-pragmatic interface conditions than the other (Sorace, 2011). However, the overuse of overt pronouns has been found in bilingual speakers of two null subject languages (Margaza and Bel, 2006; Lozano, 2006; Sorace & Serratrice, 2009). This suggests that the underspecification account at the level of knowledge representation is not sufficient to account for the non-convergence of bilinguals and monolinguals exhibited at interface structures.

The processing account considers differences between bilinguals and monolinguals at the level of processing principles that apply in the real-time integration of multiple conditions (Sorace, 2011). Roberts et al. (2008) provide evidence for the processing account – their study shows that L2 speakers of Dutch from different L1 backgrounds (Turkish and German) exhibited a processing disadvantage compared to monolingual Dutch controls in the *Optional Resolution* condition where the pronoun can co-refer with the sentence-internal local NP or the sentence-external NP. Though only German shares the same preference as Dutch when resolving pronouns in all three conditions, both the Turkish and the German L2 speakers spent more time reading the critical region in the *Optional Resolution* condition than other conditions where the pronoun resolution is not syntactically ambiguous. This suggests higher processing costs in conditions where integration of multiple types of information is required regardless of which languages bilinguals speak. Hopp (2009) argues that non-convergence at the syntax-discourse interface is partially due to increased processing demand in integrating information across grammatical modules. Hopp tested L1 Russian, L1 Dutch and L1 English advanced-to-near-native speakers of German and monolingual German controls using an acceptability judgment task and an online self-paced reading task on German *scrambling*. Hopp argues that German scrambling sits at the interfaces of syntax-morphology and syntax-discourse. When the demand of morphological checking was removed in the self-paced reading task, convergence at the syntax-discourse interface is in principle possible, even for L1 English speakers, whose L1 does not correspond to L2 German in discourse-to-syntax mappings. Hopp's study of German *scrambling* provides evidence that convergence on the syntax-discourse interface of near-native L2 speakers is not restricted by their L1 properties.

Picture Noun Phrases

Some researchers have suggested that pronouns and reflexives in PNPs (e.g. *James showed Paul a picture of him/himself*) are exempt from Chomskyan Binding Theory (Chomsky, 1981), and are influenced by both syntactic and semantic/discourse factors (Pollard & Sag, 1992; Reinhart & Reuland, 1993; Kaiser et al. 2009). Kaiser (2003) first introduced the *form-specific multiple-constraint* framework, suggesting that anaphora resolution is not determined by a single constraint but rather is the result of the interaction of multiple constraints. The form-specific approach allows for the multiple constraints to be weighted differently for different anaphoric forms. For example, reflexives in PNPs rely more heavily on structural constraints whereas pronouns exhibit more evenly matched sensitivity to structural and non-structural constraints (Kaiser et al., 2009).

Structurally Based Accounts of Anaphora Resolution in PNPs

To understand the structural constraints for PNPs, consider sentences without PNPs as a starting point. In (1) the pronoun *her* cannot refer to *Mary* and the reflexive *herself* cannot refer to *Jane*. Principles A and B of traditional Binding Theory (Chomsky, 1981) provide a structural account of this complementary distribution. According to Principle A, a reflexive must be bound to a local antecedent. Thus, in (1), the reflexive *herself* can only refer to the subject of the same clause, namely *Mary*. Principle B, on the other hand, states that a pronoun can have an antecedent, as long as the antecedent is not local or does not c-command the pronoun. Thus, in (1), the pronoun *her* cannot refer to the local subject *Mary*, but can be coreferential with *Jane*.

(1) Jane said Mary hit her/herself on the head.
(2) John saw the picture of him/himself.
(3) John told Peter about the picture of him/himself.

For PNPs in sentences such as (2), the Chomskyan Binding Theory predicts similar complementary patterns for the resolution of pronouns and reflexives. The relevant local domain in (2) is the entire clause. Based on Principle A, the reflexive *himself* must be bound to the subject of the clause, *John*. According to Principle B, local antecedents are not allowed for pronouns, so the pronoun *him* cannot refer to the subject of the clause in (2). Instead, *him* may refer to someone else not mentioned in the clause. Similarly, the local domain in (3) is the entire clause. Principle A predicts that the reflexive *himself* needs to be bound by the subject *John*. Principle B predicts that the pronoun *him* cannot refer to the subject *John*, but *him* may refer to the non-subject *Peter*. Nevertheless, the pattern in (3) does not fully reflect

speakers' interpretations (Kaiser et al., 2009). Existing work has observed that pronouns in possessor-less PNPs can refer to the subject of the sentence in certain contexts, just like reflexives (Chomsky, 1986; Keller & Asudeh, 2001; Reinhart & Reuland, 1993).

Non-structural Bias in PNPs

Existing work suggests that semantic/contextual properties of the antecedent, such as its status as the source of information or the perceiver of information, can influence the interpretation of pronouns and reflexives (Pollard & Sag, 1992; Sells, 1987). Kaiser et al. (2009) formulated *the source hypothesis*, which states that reflexives in PNPs prefer antecedents that are sources of information. According to the structurally based accounts, the reflexive *himself* in both (4a) and (4b) refers to the subject *John*. If we consider non-structural bias, based on the source hypothesis, the reflexive *himself* in (4a) is still interpreted as *John* since *John* is the source of information. However, the reflexive *himself* in (4b) favors the object *Peter*, as *Peter* is the source of information in this clause.

(4a) John told Peter about the picture of himself.
(4b) John heard from Peter about the picture of himself.
(5a) John told Peter about the picture of him.
(5b) John heard from Peter about the picture of him.

For pronouns in PNPs, Kaiser et al. (2009) proposed the *perceiver hypothesis*, whereby pronouns prefer antecedents that are perceivers of information. According to the structurally based accounts, the pronoun *him* in both (5a) and (5b) is coreferential with the object Peter. If we consider non-structural accounts, the perceiver hypothesis predicts that the pronoun *him* in (5a) is also interpreted as Peter, whereas in (5b) the pronoun *him* has a preference for coreference with the subject *John* because *John* is the perceiver of information.

Considering both structural and non-structural accounts in sentences with *told* such as (4a) and (5a), the two types of constraints guide the comprehender to the same antecedent. These sentences are referred as *non-conflict* conditions in this study. In sentences with *heard*, such as (4b) and (5b), the two types of constraints favor different antecedents, so these sentences are referred as *conflict* conditions.

PNPs in Mandarin and German

Mandarin has a different reflexive and pronoun system than English. When the Picture Noun Phrase structures are translated into Mandarin, "the picture of him" becomes "his picture" because there is no equivalent structure

in Mandarin corresponding to "the picture of him" (see (6)). It is possible that this structural difference in Mandarin yields different coreference patterns compared to English. German has a similar pronoun and reflexive system regarding the PNP structures as English (see (7)). As a result, German is predicted to have more English-like preferences in anaphora resolution in PNPs.

(6) Yuehan gen Bide tidao tade zhaopian.
John to Peter mentioned his picture
"John told Peter about his picture."
(7) John hat Peter über das Bild von ihm erzählt.
John has Peter about the Picture of him told.
"John told Peter about the picture of him."

Table 1 provides an overview of four types of PNP sentences. Recall that the root of non-convergence of L1 Mandarin L2 English speakers could be either crosslinguistic influence from L1, or general L2 processing limits, or both. By comparing German and Mandarin L2 speakers of English, one can gain some insight into the root of non-convergence in L2 advanced speakers.

Table 1
PNPs in English, German and Mandarin

	English	German	Mandarin Chinese
Reflexives	**John** told Peter about the picture of **himself**.	**John** hat Peter über das Bild von **sich** erzählt.	**Yuehan** gen Bide tidao **tazijide** zhaopian.
	John heard from Peter about the picture of **himself**.	**John** hat von Peter über das Bild von **sich** gehört.	Yuehan ting **Bide** tidao **tazijide** zhaopian.
Pronouns	John told **Peter** about the picture of **him**.	John hat **Peter** über das Bild von **ihm** erzählt.	**Yuehan** gen Bide tidao **tade** zhaopian.
	John heard from Peter about the picture of **him**.	**John** hat von Peter über das Bild von **ihm** gehört.	Yuehan ting **Bide** tidao **tade** zhaopian.

Words in bold indicate the preferred coreference by native speakers of that language.

Research Design

The present study aims to address the following research questions: 1) Do advanced L2 speakers of English exhibit non-convergence with native English speakers in resolving pronouns and reflexives in the PNPs? 2) If yes, does this non-convergence reflect an influence of the L1 on anaphora resolution in L2 or general L2 processing inefficiency?

Participants

Groups of 20 L1 Mandarin, 20 L1 German highly proficient speakers of English and 22 native English speakers were recruited. They were all students at the University of Edinburgh. L2 speakers were selected based on their latest English language test scores (IELTS Band Score 7.5 or above, or other equivalent English language test scores). L2 speakers started learning English between the ages of 6 and 13 in school in their home countries, and had lived in the UK for at least six month by the time of the study. The native controls were UK residents, who self-reported they had never been consistently exposed to languages other than English.

Materials

The data were collected using a Picture Verification Task (PVT) and a linguistic background questionnaire. In the PVT, 32 target items (picture-sentence pairs) were designed. The target displays contained two characters with one on each side of the display and a framed picture of one of the two characters in the middle. The images were adapted and edited from online free clip-art images (Openclipart, 2010). A sentence with PNP without possessors, as shown in (8), appeared on the top of each display. For the target items, verb type (told/heard), anaphoric form (him/himself) and visual display (subject pictured/object pictured) were crossed to create eight conditions. With *told*, the subject of the sentence is the source of information and the object is the perceiver of information, whereas with *heard*, the pattern is reversed (see examples in 3.2). The experiment also included thirteen filler sentences.

(8) John {told/heard from} Peter about the picture of {him/himself} on the wall.

Each participant saw 16 target trials with pronouns and 16 with reflexives. Eight of the reflexive sentences appeared with *told* and eight with *heard*. Half of the reflexive sentences were paired with a display showing a picture of the subject of the sentence and half were paired with a picture showing the object. The same was done for the pronoun items. Half of the items contained two male characters and half contained two female

characters. The pictures were counterbalanced for position of the subject of the sentence (left/right) and position of the source of information (left/right). The order of presentation of the visual display was randomized. The linguistic questionnaire asked about the participants' linguistic background, such as first language, scores on an English language test and self-reported language use.

The experiment was run on a MacBook pro with a 13'' screen using Keynote slides. Instructions were given in English and appeared as text on the screen at the beginning of the task. Participants were asked to indicate whether or not the sentence matched the visual displays, by ticking "yes" or "no" on the answer sheets for each item. They had one practice trial to familiarize the task. The task was self-paced, but participants were encouraged to give their intuitive response. Participants filled in a linguistic questionnaire after completing the PVT.

Results

The percentages of "yes" responses by the three groups in the PVT are given in Figure 1. The percentages presented in Figure 1 are calculated by subtracting the "yes" percentage of the object from the "yes" percentage of the subject pictured. The vertical axis denotes the degree of preference between the subject pictured and the object pictured on a gradient basis. Positive percentages indicate preference for the subject whereas negative percentages indicate preference for the object.

In the *reflexive conditions*, there was an overall preference to interpret the reflexive as referring to the subject, though the strength of preferences varied by group. The strength of preference was modulated by the verb manipulation. In conditions with *hear*, where the structural and non-structural constraints conflict, the preference for the subject weaker than that in conditions with *tell*. In the *pronoun conditions*, there was an overall preference to interpret the pronoun as referring to the object. The verb manipulation also influenced participants' choices. In conditions with *hear*, the object is the source of information which is against the semantic perceiver bias for pronouns. L1 Mandarin and L1 German participants still showed a preference for the object (21.3%, 23.8%) though it is weaker than that in conditions with *tell* (55.0%, 77.5%). L1 English participants, however, showed a subtle preference for the subject in conditions with *hear* (4.5%) where the subject is the perceiver of information.

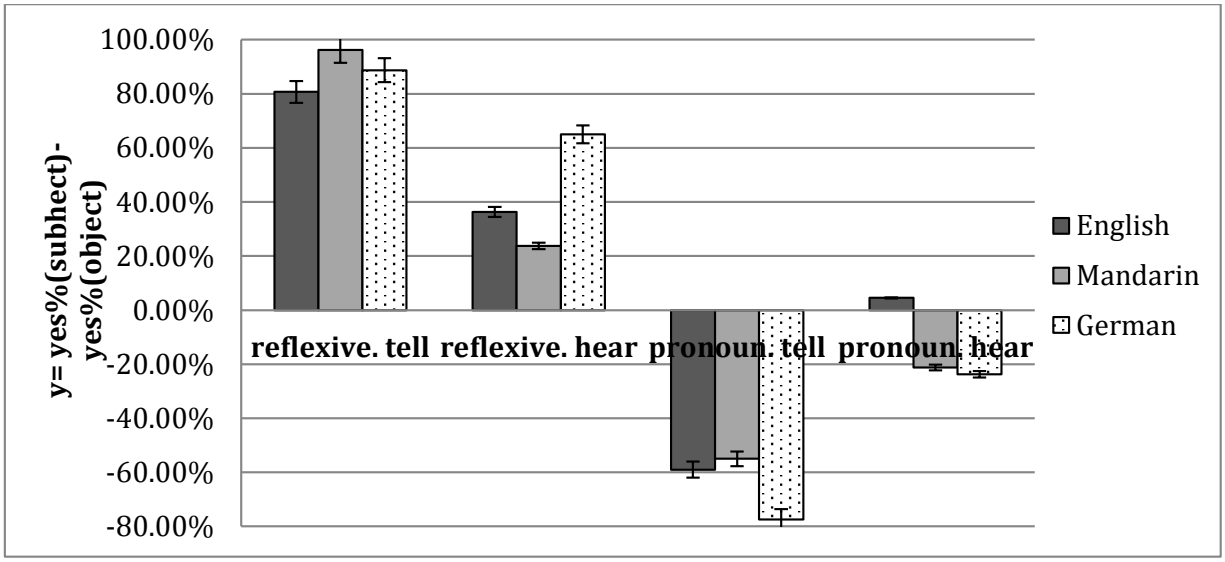

Figure 1. Percentage of "yes" answers in PVT

Two mixed-effects logistic regression models were built to analyze the data. The first model (henceforth referred to as Model A) examines whether there are any differences in anaphora resolution among the three groups in general with respect to structural and non-structural constraints. The second model (henceforth referred as Model B) looks at whether there are any differences among the three groups in specific conditions.

Model A analyzes the binary yes/no response outcomes as a function of *Anaphor* (pronoun/reflexive), *Picture* (subject pictured/object pictured), *Semantic Role* (source of information/perceiver of information), and *Language* (English/Mandarin/German), with *Participant* and *Item* as random effects. The independent variables were centered in order to avoid collinearity (Jaeger, 2008). *Language* was converted to a sum-coding numeric representation, and to test for main effects of (and interactions with) *Language*, a likelihood-ratio test between mixed-effects models differing only in the presence or absence of the *Language* main effect or its interaction (Levy, 2014) was conducted. For the random effects, both *Participant* and *Item* contained random intercepts and random slopes (not crossed, due to failure to converge). When a model failed to converge, the random effect with the least variance was removed (Barr, Levy, Scheepers & Tily, 2013). This model contained maximum random effects, which take potential individual differences into account.

Analyses show a main effect of *Picture* (β= .58, p< .001) which was driven by a significant *Picture* × *Anaphor* interaction (β=1.56, p< .001), whereby reflexives favored subject pictures and pronouns favored object pictures, indicating sensitivity to the structural constraints. There was also a significant *Anaphor* × *Semantic Role* interaction (β= .85, p< .001), whereby

reflexives preferred the sources of information whereas pronouns preferred the perceivers of information, indicating sensitivity to non-structural constraints. To test main effects and interactions with *Language*, likelihood-ratio tests were performed. The results show that there was a significant *Language* × *Anaphor* × *Picture* interaction ($p < .001$). The likelihood-ratio tests also show a significant *Language* × *Anaphor* × *Semantic Role* interaction ($p < .01$). Additionally, there was a significant *Language*× *Semantic Role* interaction ($p < .001$). The results show that all groups exhibited the same direction in interpreting PNPs: reflexive favored the subject whereas pronoun favored the object, though the strength of preference varied. There was non-convergence between L2 speakers and native speakers in interpreting PNPs with regard to structural and non-structural constraints and this non-convergence is more quantitative than qualitative.

Model B analyzes the binary yes/no response outcomes as the function of *Picture* (subject pictured/object pictured) and *Language* (English/Mandarin/German) with *Participant* and *Item* as random effects (both random intercepts and random slopes included) in four subsets of the data. The independent variable *Picture* was centered. Likelihood-ratio tests were performed to test the main effect of *Language* and *Language* × *Picture* interaction.

In the reflexive sentences with *tell* (e.g. *John told Peter about the picture of himself*), there was a highly significant main effect of *Picture* (β=3.10, $p < .001$), where the participants gave significantly more "yes" answers when the subject of the sentence was pictured than when the object of sentences was pictured (97.18 % vs. 8.47%). In the pronoun sentences with *tell* (e.g. *John told Peter about of the picture of him*), there was a highly significant main effect of *Picture* (β=-2.22, $p < .001$), where the subject pictures received significantly fewer "yes' answers than the object pictures (18.15% vs. 81.45%). There was no significant *Language* × *Picture* interaction in both conditions, indicating there is no significant differences among the three groups in *non-conflict* conditions.

In the reflexive sentences with *hear* (e.g. *John heard from Peter about the picture of himself*), the analysis reveals a significant main effect of *Picture* (β=1.35, $p < .001$), where participants gave significantly more "yes" responses when the subject of the sentence was pictured than when the object was pictured (74.19% vs. 33.06%). The likelihood tests show a significant *Language* × *Picture* interaction ($p < .05$). This indicates that the three groups had an agreed preference for antecedent in reflexive conditions, but the strength of preference varied. In the pronoun sentences with *hear* (e.g. *John heard from Peter about the picture of him*), analyses show a significant main effect of *Picture* (β=- .40, p= .048). Participants gave 46.77% "yes" responses when presented with a picture of the subject, and 59.68% "yes"

responses when resented with a picture of the object. No significant *Language* × *Picture* interaction was found and this might be due to limited statistical power of a small size sample. I will revisit the pronoun conditions with *hear* in further analyses.

Follow-up pairwise analyses were conducted in conditions with *hear* where the structural and non-structural constraints are in conflict. In reflexive sentences with *hear*, the analysis comparing Mandarin and English speakers showed a significant main effect of *Picture* (β= .91, p< .01). The analysis comparing German and English speakers shows a significant main effect of *Picture* (β=1.74, p< .001) and significant *Language* × *Picture* interaction (β= .69, p< .05). Finally, the analysis comparing Mandarin and German speakers reveals a significant effect of *Picture* (β=1.52, p< .001), a significant effect of *Language* (β= .36, p< .05) and a significant *Language* × *Picture* interaction (β=- .72, p< .05).

In pronoun sentences with *hear*, the comparison of Group Mandarin and Group English shows a marginally significant *Language* x *Picture* interaction (p= .09). There was no significant effect of *Picture* (p= .29) or *Language* (p= .53). The comparison of Group German and Group English shows an approaching significant *Language* × *Picture* interaction (p= .1). There was no significant effect of *Picture* (p= .27) or *Language* (p= .60). Finally, the analysis comparing Mandarin and German speakers reveals a significant effect of *Picture* (β= -.70, p< .05), where participants gave significantly more "yes" responses when a picture of the object was presented than when a picture of the subject was presented (65.63% vs. 43.13%). There was neither a significant effect of *Language* (p= .94) nor a significant *Language* × *Picture* interaction (p= .90).

Discussion

The PVT was designed to test whether and why the interpretation of pronouns and reflexives in PNPs by advanced L2 speakers of English is different from that of native English speakers. The above analyses suggest that advanced L2 speakers of English exhibit non-convergence with native English speakers in interpreting pronouns and reflexives in the PNPs. This is consistent with the Interface Hypothesis (Sorace & Filiaci, 2006), which predicts that very advanced L2 speakers may show non-convergence with native speakers in structures involving an interface of syntax and other cognitive domain such as the pronouns and reflexives in PNPs.

Follow-up analyses provide insights into why advanced L2 speakers exhibit non-convergence with native speakers in conflict conditions. In each pairwise analysis of the reflexive conditions with *hear*, there was a significant effect of *Picture*, signaling all three groups of participants

significantly preferred one type of picture than another. In this case, they overwhelmingly accepted the subject pictures. However, there are also differences among the three groups. L1 Mandarin speakers are significantly more tolerant in accepting the object of the clause as the antecedent than L1 German speakers, which matches their preferences in their L1. The acceptance of the object of the clause by English native speakers is somewhere in the middle between L1 Mandarin speakers and L1 German speakers. The differences of the interpretation by the two L2 groups in the reflexive conditions seem to reflect crosslinguistic influence as the L2 speakers map their preferences in their L1 into their L2. One possible explanation is that reflexives are structures more syntactically constrained compared to pronouns, which are structures more contextually constrained. Reflexives in PNPs, analogous to internal interfaces, seem more vulnerable to crosslinguistic influence (Sorace & Serratrice, 2009).

The follow-up analyses of the pronoun conditions with *hear* show the *Language* × *Picture* interaction approached significance and there was no significant effect of *Picture* when comparing the interpretation of L1 Mandarin and that of L1 English speakers. The same statistical results were found when comparing the interpretation of L1 German and that of L1 English speakers. This suggests that advanced L2 speakers do not have the same pattern as native speakers in resolving pronouns in conflict conditions. Though the *Language* × *Picture* interactions are not statistically significant (marginal) in the above mentioned analyses, the absence of a significant effect of *Picture* signals that advanced L2 speakers and native speakers do not have an agreed preferred antecedent in pronoun conditions with *hear*. Monolingual English speakers tend to resolve the pronouns as the perceivers of information (the subject of the clause in this condition), following the non-structural constraints. Both groups of L2 speakers, regardless of different preferences in L1, tend to resolve the pronouns to the object of the clause, following the structural constraints. This suggests that crosslinguistic influence is unlikely to occur in the pronoun conditions. The L2 speakers' non-convergence with native speakers in the pronoun conditions seems to reflect processing inefficiency on the part of L2 speakers more generally. One possible explanation is that pronouns are structures more contextually constrained than reflexives are, so they are more vulnerable to processing problems compared to reflexives (Sorace & Serratrice, 2009; Sorace, 2011).

The results show that advanced L2 speakers exhibit non-convergence with native speakers in *conflict* conditions, and convergence in *non-conflict* conditions. In conflict conditions, 1) advanced L2 speakers have the same preference with native speakers when resolving reflexives in PNPs, though the degrees vary according to their L1; 2) advanced L2 speakers adopt

different patterns (or at least not the same) as native speakers when resolving pronouns in PNPs regardless of what their L1s are.

The results show that advanced L2 speakers seem to exhibit more divergence with native speakers when interpreting pronouns than when interpreting reflexives in the conflict conditions. One potential reason is that the structural constraints weigh more heavily than the non-structural constraints in reflexives in PNPs whereas structural constraints and non-structural constraints are more evenly matched in the pronoun conditions in PNPs (Kaiser et al., 2009). When the two types of constraints are in conflict, it is more challenging for L2 speakers to make a decision in the pronoun conditions than in the reflexive conditions. This can be attributed to the fact that the two types of constraints in competition are almost evenly matched, which imposes a greater processing demand for the comprehender.

Based on the results within the scope of this study, I argue that the presence or absence of conflicts of different types of information predicts whether or not there is non-convergence between advanced L2 speakers and native speakers. The type of interface structures, pronouns or reflexives, predicts the degree of non-convergence between advanced L2 speakers and native speakers. The problem of non-convergence is not caused by the interface structure *per se*. The interface structure provides the possibility of having conflicts of multiple types of information. And it is the conflict of different types of information that makes things more challenging for advanced L2 speakers. Also, different types of interface structures are associated with different assignments of weights to structural and non-structural constraints, which may yield advanced L2 speakers' different degrees of non-convergence with native speakers.

With respect to the reason why non-convergence between advanced L2 speakers and native speakers occurs, there is no simple answer to this question. Non-convergence of different structures can reflect different problems. Neither crosslinguistic influence nor processing issues can explain all problems exhibited by advanced L2 speakers at interface structures involving syntax and semantics/pragmatics. Analyses indicate that interface structures that rely more heavily on syntax, such as reflexives in PNPs, are more vulnerable to crosslinguistic influence. Analyses also suggest that interface structures that are more contextually constrained, such as pronouns in PNPs, are less likely to be affected by L1 and are more vulnerable to processing inefficiency.

This study lends preliminary support to a model of L2 anaphora resolution in which different weighs and directions of structural and non-structural information are considered on a gradient basis. Further studies are required to better incorporate these findings and the nature of L2 processing. To test the interaction between proficiency and non-convergence at different

interface conditions, L2 speakers from different levels of proficiency are needed. To investigate the processing account for non-convergence in very advanced stage of L2 acquisition, future research could test native speakers in both normal and overloaded-processing conditions (e.g. noise conditions, limited-time conditions) using tasks demanding different levels of processing efforts.

Notes

1. In this study, "bilingual" is used in a broad sense to denote people who speak two languages regularly, but it does not necessarily mean that they are equally good at both languages.
2. Kaiser et al. (2009) investigated PNPs with and without possessors (e.g. Peter's picture of him/ the picture of him/). The present study focuses exclusively on PNPs without possessors.

Acknowledgement

I would like to thank Prof. Antonella Sorace and Dr. Hannah Rohde for their help in this project, and Daniel Lawrence for useful discussion. Any remaining errors are my own.

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高級英語學習者代詞和自反代詞的消解

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摘要

此次研究旨在考察英語高級學習者是否以及為何會在英語代詞和自反代詞消解上和英語母語者產生分歧，主要圍繞跨語言影響和二語加工兩個方面進行探討。該研究使用圖片驗證任務考察代詞和反身代詞在含有圖片名詞短語（Picture Noun Phrase) 的句子中的消解。 根據現階段的研究顯示，在圖片名詞短語句子中，反身代詞的消解主要依靠句法約束，而代詞的消解則同時依靠句法約束和語義或語用因素(Kaiser et al., 2009)。 研究結果表明高級語言學習者与母語者在理解界面結構（Interface structures, Sorace & Filiaci, 2006) 上的分歧, 不是因為界面結構本身，而是因為來自句法和語義等方面不同類型的信息發生衝突。界面結構提供了不同類型的信息產生衝突的可能，而不同類型的界面結構則預測不同程度的分歧。在句法約束強的界面，例如自反代詞， 分歧較可能反映跨語言的影響；而在語境約束強的界面，例如代詞，分歧較可能反映二語加工方面的問題。

關鍵詞： 代詞消解，二語習得，母語影響，二語加工