Journal of Modern Education Review, ISSN 2155-7993, USA
March 2022, Volume 12, No. 3, pp. 189–198
Doi: 10.15341/jmer(2155-7993)/03.12.2022/004

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A Study of Binding Theory: Principle A

Jack Kuo-Zheng Feng
(Department of English, National Chengchi University, Taiwan)

Abstract: In terms of language instruction and acquisition, theories of syntax can play an important part in enhancing both educators' and learners' language proficiency. The present study aimed to reinvestigate the existed issues in binding theory. Particularly, the focus was put onto the issues of Principle A in the binding theory. A few issues were included in this present study, and they were ECM verbs, subject accessibility, and I-within-I constraint. A literature review method was applied to solve the problems. Relevant literatures were discussed in the hope of supporting the findings. Possible solutions were provided in the study. To sum up, conclusion of the findings was presented. Additionally, pedagogical implications and limitations of the study were provided as well.

Key words: binding theory, ECM verbs, subject accessibility, I-within-I filter

1. Introduction

1.1 Background of the Study

So far, we have learned the three principles of binding theory. For principle A, it says that anaphors should be bound in its binding category, and let's consider the following sentences for further illustrations, seen the example (1):

(1)

(a) Susan$_i$ punched herself$_i$ on the face.

*(b) Susan$_i$ punched herself$_j$ on the face.

In sentence (1a), the subject of the matrix clause "Susan" is coindexed with the anaphoric object "herself". According to the binding theory, the subject "Susan" c-commands the object "herself", and they are coreferential. In other words, the subject "Susan" is the antecedent of the anaphoric object "herself". The anaphoric object "herself" is bound within the binding domain. Thus, sentence (1a) is grammatical. However, the sentence (1b) is ungrammatical. Even though the subject of the matrix clause "Susan" c-commands the anaphoric object "herself", they are not coindexed. Therefore, they refer to two different things, so the sentence (1b) violates Principle A.

For principle B, it says that all pronouns should be free in its binding domain. Let's consider the following examples for further illustration, seen the example (2):

(2)

(a) John$_i$ likes him$_j$ very much.

*(b) John$_i$ likes him$_i$ very much.

In sentence (2a), the subject "John" c-commands the object "him", and they are not conindexed. So, the subject

Jack Kuo-Zheng Feng, Ph.D. Candidate, Department of English, National Chengchi University; research area: syntax. E-mail: jack03150402@gmail.com.

"John" is not the antecedent of the object "him", so the sentence (2a) fulfills Principle B. For sentence (2b), the subject "John" c-commands the object "him", and they are conindexed. In the view of this, the object "him" is bound. Thus, the sentence (2b) violate Principle B.

For principle C, it says that all R-expressions should be free everywhere, and let's consider the following sentences for further illustrations, seen the example (3):

(3)

(a) I_i want $John_j$ to leave.

*(b) I_i want $John_i$ to leave.

In example (3a), the subject of the matrix clause "I" c-commands the subject of the nonfinite clause "John". Besides, the subject of the matrix clause "I" and the subject of the nonfinite clause "John" are not coindexed. Hence, principle C is fulfilled. However, in (3b), the subject of the matrix clause "I" and the subject of the nonfinite clause "John" are coindexed. In the view of this, it violates the principle C that all the R-expressions should be free everywhere.

However, there are more details could be discussed. In this term paper, we especially draw our attentions on principle A.

1.2 Motivation of the Study

Based on what we have learned so far, there are some sentences that the binding cannot solve or explain. First of all, let's consider the example (4):

(4)

(a) $I_i$wantmyself$_i$ to be killed.

(b) $Jack_i$ considered himself$_i$ to be stupid.

(c) Jack believes that he is stupid.

In here, according to principle A, it says that anaphors should be bound in its binding domain. The problem is that in the nonfinite clause (a) and (b), "myself to be killed" and "himself to be stupid", "myself" and "himself" are subjects of the nonfinite clauses. Then, it seems that no other antecedents c-command them. According to principle A, they are ungrammatical; whereas, (c) is grammatical. However, they are all grammatical. How to explain these grammatical sentences becomes a critical issue. Therefore, there should be something more to further modify the principle.

Next, for some special constructions, the anaphor seems to be free, let's consider the following example (5):

(5)

(a) $Jack_i$ takes every criticisms of himself$_i$.

(b) $Jack_i$ said that Sam's pictures of himself$_i$ were ugly.

In here, both the sentences' anaphors "himself" should be bound by "Jack". However, there seems no antecedents to c-command anaphors. However, these two sentences are grammatical. The problem of how to account this phenomenon is somehow eager to be solved.

Furthermore, whenever there are passive constructions, the situation seems to be more complex, seen in example (6):

(6)

(a) Mary is believed to be a genius.

(b) *Mary is believed John be a genius.

In example (6a), this sentence is grammatical because it is a finite clause contains a nonfinite clause, and the subject of the matrix clause "Mary" raised from the specifier of nonfinite TP in the D-structure to the matrix finite clause of TP specifier position for case reason, which this operation is called subject-to-subject raising. However, sentence (6b) is ungrammatical simply by inserting another DP to the place where the subject has moved out. The same situation also occurs in the following sentences (7):

(7)

(a) Sally seems to be intelligent.

(b) *Sally seems Mike to be intelligent.

Sentence (7a), which also contains a subject-to subject traising, is grammatical; while in (7b), the subject of the nonfinite clause "Mike" seems to play the crucial point. Therefore, it is important to find the reasons to account for those phenomena.

2. Literature

2.1 ECM Verbs in Binding

In this section, we will see how binding condition will change in finite and non-finite sentences, with a focus on ECM verbs. Observe the following sentences. Finiteness of the sentences seems to affect binding situation.

(1) *John$_i$ believes himself$_i$ is handsome.

(2) John$_i$ believes himself$_i$ to be handsome.

The grammaticality judgment is completely the opposite in sentence (1–2). There are two ways to explain this. First, it is because there is a subject-to-object raising phenomenon in sentence (2) (see tree Figure 1).

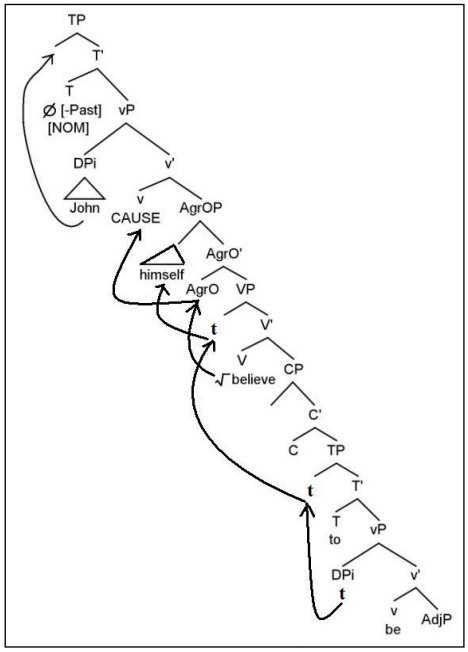

Figure 1 Subject-to-Object Raising

The DP *himself* moves to the specifier of AgrOP for case reasons, thus it moves out of the CP, its original binding domain. Once it is in the higher clause structure, its new binding domain will be the whole matrix sentence

which contains the ECM verb "believe". In this case, it will contain its binder (antecedent) *John*. Therefore, the anaphor *himself* would be properly bound by matrix subject *John* and thus the sentence is grammatical.

Second, let us redefine binding domain. The binding domain for anaphor must contain an XP, in which the head X governs and gives case to anaphor. Let's look into sentence (2). The matrix verb "believe" governs and exceptionally gives an accusative case to the embedded subject "himself", therefore the binding domain for the anaphor extends to the whole matrix clause. Meanwhile, "himself" is properly bound by the matrix subject "John". Thus, the sentence is grammatical.

However, the situation in sentence (1) is right the opposite. The embedded clause is a finite clause of CP structure. The anaphor 'himself' is governed and given a nominative case by the finite T (see tree Figure 2). Yet, there is no other DP in the specifier of TP which can bind "himself". Therefore, 'himself' is free in its binding domain, the sentence is ungrammatical.

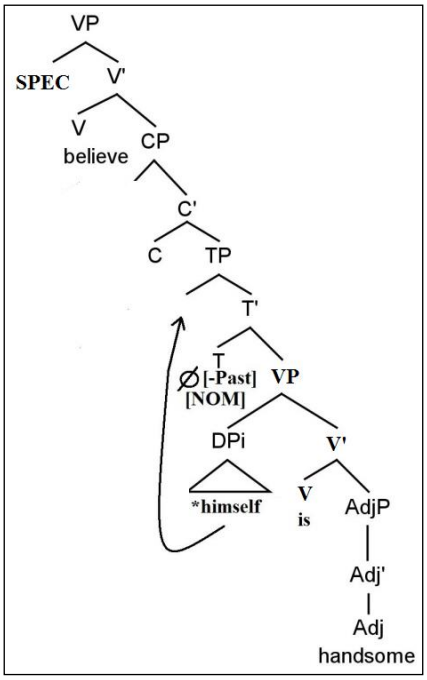

Figure 2 Governed Anaphor

At this moment, here raise a question. What prevents the embedded subject in sentence (1) from being governed by the matrix verb "believe"? It is the CP barrier, as illustrated in Figure 3. It is said that the CP barrier in a finite clause will be strong enough to prevent the embedded subject "himself" from being governed by the external governor, namely the matrix verb "believe". However, when it comes to nonfinite embedded clause, since the embedded subject doesn't have a case, the ECM verb then will resolve this kind of CP layer to exceptionally give an accusative case to the embedded subject. In this case, TP alone will be too weak to defend from the government of the external ECM verb to the embedded subject, as showed below.

John believes [$_{TP}$ **himself** to be handsome].

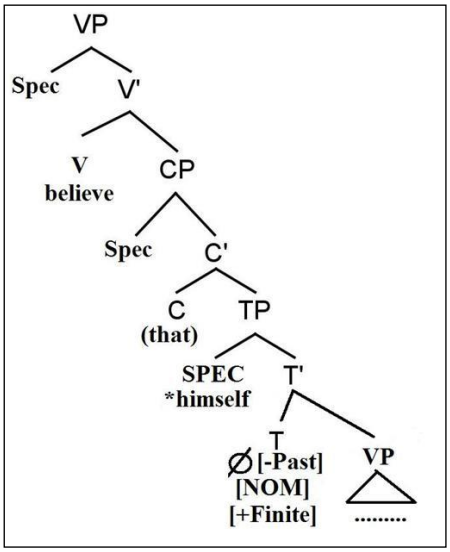

Figure 3 The Barrier of CP

Let us see look at more examples. There are some other ECM verbs such as *expect* and *want*.

(3) $Mary_i$ expects $herself_i$ to be tall.

(4) *$Mary_i$ wants $John_j$ to help $herself_i$.

(5) $Mary_i$ wants $John_j$ to help $himself_j$.

In sentence (3), the embedded subject is governed and given an accusative case by matrix ECM verb. The binding domain for anaphor thus is the whole matrix sentence containing the ECM verb, not the embedded clause. So, the reflexive "herself" is properly bound by the matrix subject "Mary" and therefore the sentence is grammatical.

In sentence (4), the governor and case assigner for *herself* is the verb *help* so the antecedent in its binding domain is "John". Since "herself" cannot find a proper binder in its binding domain, namely *John to help herself*$_i$, the anaphor is not bound and the sentences is incorrect.

In sentence (5), since the reflective 'himself' can find a proper binder "John" in its binding domain, namely *John*$_i$ *to help himself*$_i$, the sentence is correct for the same reason as it is in sentence (4).

2.1.1 Summary

So far, we have discussed two ways to solve ECM verb structure problems. First, it is because anaphors in ECM structures will have subject-to-object raising phenomenon. Anaphor will raise to the specifier of the AgrOP for case reason, since then it moves out of its original position in CP. At this moment, the new binding domain for anaphor will contain a coindexed antecedent which c-commands it. Thus the sentence is grammatical. Second, we change the definition of binding domain. Binding domain of anaphor must contain an XP, in which the head X governs and gives case to them. The reason why ECM verbs can govern nonfinite embedded subject rather than a finite embedded one is because ECM verbs can resolve CP barriers in nonfinite embedded clause. It is the CP barriers in finite embedded clause that prevents its subject from being governed by the matrix ECM verb.

However, applying these two ways, we still may falsely predict the grammaticality of the following sentences.

1) *$John_i$ believes [any descriptions of $himself_i$]$_i$.

2) $John_i$ believes [any descriptions of $himself_i$]$_j$.

3) John believes that [a picture of $himself_i$]$_j$ is on sale.

Supposedly, sentence (I) should be grammatical, since "himself" is properly bound by John, but it is not the

case. However, sentence (II) shows that if the complex DP "*any descriptions of himself*" does not co-index with "*himself*", the sentence will become grammatical. Besides, in sentence (III), there is a CP barrier. Theoretically, *himself* is free in its binding domain, this sentence should be ungrammatical. However, the grammaticality judgment is wrong again.

To sum up, it seems that complex DP and its index also played an important role in binding condition. We will discuss this kind of situation in the next section.

2.2 Subject Accessibility

Before starting another central topic, please observe the following data firstly.

(1)

(a) $John_i$ thinks that a picture of $himself_i$ is on sale.

(b) * $John_i$ thinks that Mary bought a picture of $himself_i$.

(c) * $John_i$ thinks that $himself_i$ should win the election.

In (1a) the anaphor is inside the subject, DP — a picture of himself, whereas in (1b) the anaphor is inside the direct object. The subject position is probably special in some way. They cannot be too special, though, because as (1c) shows if the anaphor is itself a subject, then the sentence is ungrammatical, just as we would expect. So the key thing must be that the anaphor in (1b) is a subpart inside the subject. How can we implement something that will correctly predict that (1a) is grammatical while ruling out (1b) and (1c)?

Chomsky (1981) introduced the concept of the "accessible" subject as a way of solving the problems posed by (1a)–(1c). In order for a subject to count as an "accessible" subject for an anaphor, it has to meet the following condition:

(2)

α is an accessible subject for an anaphor β if and only if (hypothetical) coindexation between the anaphor and the subject violates no grammatical principle.

That sounds complicated, but it's actually straightforward once you see it in action. Looking at the grammatical (1a), what we want to make sure is that the embedded TP is not the relevant domain for the anaphor. Instead, we want the matrix TP to be the binding domain. By applying (2), the minimal XP containing the anaphor and the anaphor's governor is still the NP picture of himself, so we're looking for an accessible subject. The embedded TP has a subject, namely a picture of himself, but it is necessary to see whether hypothetical coindexing of the proposed subject and the anaphor violates any grammatical principle. We say "hypothetical" here because we're not proposing that the two things are supposed to be actually coindexed. A picture of something is inanimate, but a person is animate, so it wouldn't make any sense to literally coindex the two. This is just a hypothetical test for a situation — if we were to do it, would there be a problem?

Let's see what happens when we do that. If we hypothetically coindexed the anaphor himself with the proposed subject a picture of himself, we get the following configuration:

(3) John thinks that [a picture of $himself_i$]$_i$ is on sale.

You might doubt that whether this violate any grammatical principle. In fact, Chomsky claimed that it does actually. The reason is that there is actually a principle, which is called the i-within-i filter, and basically rules out any configuration in which a smaller subpart of something is coindexed with the larger whole thing, as illustrated by (4):

(4)

I-Within-I Filter

*[…X_i…]$_i$

Perhaps, something like (4) to avoid referential circularity is needed. Basically, as a general rule, if you're trying to figure out what some expression refers to, you need to know what all of parts refer to. So in (4) in order to figure out what the whole things refer to, part of what you need to figure out is what X refers to. However, if X and the whole expression are coindexed, you can't figure out what X refers to until you know what the whole thing refers to. But to do that it is needed to know what X refers to, and so on. You go round in circles. (4) rules out these configurations.

To give a slightly less abstract illustration of the same point, consider the sentence in (5), which also contains an i-within-i violation:

(5) *[The picture of it$_j$]$_i$ is on the table.

In order to determine what the picture of it refers to, it is necessary to know what it refers to. But in order to know what it refers to, we need to know what the picture of it refers to, and we're back where we started. If you try to imagine what (5) could mean, you end up with an infinite regress of pictures going into the distance, as if you had two mirrors reflecting each other. If, on the other hand, there is an indexation which does not create an i-within-i configuration, there's no problem:

(6) [The picture of it$_i$]$_j$ is on the table.

In (6), it has index "i", and so refers to some previously mentioned entity, like your new computer or something. For the DP subject, it has a different indexation, which refers to different things to "it" — the object of the preposition "of". There is no referential circularity here, and thus no problem with interpretation.

(7) John$_i$ thinks that a picture of himself$_i$ is on sale.

The key intuition behind the notion "accessible" subject is that a picture of himself cannot serve as a subject for the anaphor "himself", because that would require coindexation between himself and picture of himself, which is an i-within-i violation. Therefore, although the minimal XP which contains the anaphor, its governor and a subject is the embedded TP, the subject of that TP is not accessible to the anaphor. Therefore, it is allowed (and required) to look higher in order to find an antecedent for DP — himself.

Once we've gone past the embedded TP, the next category which has any kind of subject at all is the matrix TP John thinks that a picture of himself is on sale. The subject is of course "John". Would hypothetical coindexation of John and himself violate any grammatical principle? In particular, would it create an i-within-i configuration? No. Neither John nor himself is contained with the other, so there's no problem. John is a subject which is accessible to himself. Therefore, the minimal XP which contains the anaphor himself, a governor of himself and a subject which is accessible to himself is the matrix TP. Do we find an antecedent for himself? Yes, it's John. Therefore, the sentence in (7) is predicted to be grammatical.

To sum up, according to Chomsky's revision (also cited in Reuland, 2006) under certain conditions, an anaphor can be appropriately bound by an antecedent that is outside the finite clause containing the anaphor. This is illustrated in (8):

(8) The boys were afraid [that [pictures of themselves] would be on sale]

In order to count for the computation of the binding theory of an anaphor, a subject must be accessible to the anaphor. Accessibility is defined in (9):

(9) α is accessible to β if and only if β is in the c-command domain of α, and assignment to β of the index of α

would not violate the i-within-i condition.

For a more brief version (10),

(10) i-within-i condition

[γ . . . δ . . .], where γ and δ bear the same index.

In the case of (8), co-indexing [pictures of themselves] and would by "subject-verb" agreement (irrespective of the fact that the auxiliary would does not carry overt agreement in English), and subsequently co-indexing themselves and would by the "test indexing" of (9), yields the indexing configuration of (11):

(11) The boys were afraid [that *[γ pictures of themselves$_i$]$_i$ would$_i$* be on sale].

This configuration violates (9), hence is marked illicit, and therefore *would* does not count as an accessible SUBJECT for *themselves.* Hence, γ is not a governing category for *themselves,* which may therefore look for an antecedent in the next higher clause. According to Chomsky (1986), he proclaimed that this is one of the reasons for exploring alternative ways to account for this type of fact.

2.3 DP Trace in Binding

Starting from this section, we examine if the covert DP also abide by the Binding Condition. If so, which Principle (A, B, or C) does it obey?

DP traces occur at the two major DP-movement transformations, namely Passivization and Raising. Since in both transformations, the trace is always co-indexed and c-commanded by its antecedent in the argument position. Thus, DP trace is regarded as an anaphor in nature and therefore must obey Binding Condition, Principle A.

Let's examine the two types of DP-movements one by one.

2.3.1 Passivization structure:

(1)

(a) Mary was awarded *t* the first prize.

(b) Mary is believed *t* to be the winner.

(c) *Mary is believed *t* may be the winner.

In sentence (1a), the DP trace was governed by the verb "awarded" so the Binding Domain is the whole sentence and the antecedent is the moved DP, which matches well with the DP trace. Hence in Passivization DP trace is like an anaphor in behavior and abides by the Principle A. The same situation holds for sentence (1b). DP trace is bound properly within the sentence. The DP trace was also governed by the verb "believe", so the Binding Domain is the whole sentence and the antecedent is the moved DP, which the antecedent binds the DP trace.

Sentence (1c) is different. DP trace is inside a tensed embedded clause and therefore governed by TENSE (the finite INFL). Hence the Binding Domain is the embedded clause and there is no antecedent under the lower TP (TP2). And, the subject of the embedded clause (the DP trace) in the specifier of VP is raised to the higher place, the specifier of TP2. So, the DP trace itself is an antecedent. (The DP trace can't find its antecedent.) This way, the DP trace is not bound with its Binding Domain, and this sentence is ungrammatical. In other words, the DP trace has its own governor, but is not bound by any DP. Thus, the sentence is ungrammatical. Briefly, this Binding Principle can replace the former Tensed Sentence Constraint to account for the ungrammaticality of this type of sentences.

2.3.2 Raising structure:

(2)

(a) Sally seems *t* to be best singer.

(b) *Sally seems *t* Mike to like *t*.

(c) *Sally seems *t* will be best singer.

In raising structure, the verb "seem" of sentence (2a) governs the complement TP, not CP. Hence, the Binding domain is the whole sentence and the DP trace is properly bound by its antecedent DP in the matrix subject position. So, this sentence is correct (grammatical).

In sentence (2b), DP trace is in the object position governed by the verb "like". Hence the Binding Domain is the embedded clause. The subject is the embedded subject "Mike" which is not consistent with the Trace in features. In other words, the subject in the embedded sentence (Mike) doesn't have the same index as the DP trace, and the DP trace can't be bound by its antecedent. Therefore, this sentence is incorrect (ungrammatical).

In sentence (2c), DP trace is inside a tensed sentence and governed by TENSE (the finite INFL). So, the Binding Domain is the embedded clause and there is no antecedent under the lower TP (TP2). And, the subject of the embedded clause (the DP trace) in the specifier of VP is raised to the higher place, the specifier of TP2. So, the DP trace itself is an antecedent. (The DP trace can't find its own antecedent.) This way, the DP trace is not bound with its Binding Domain, and this sentence is incorrect (ungrammatical). In other words, the DP trace has its own governor, but is not bound by any DP. Thus, the sentence is ungrammatical. Briefly, this Binding Principle can replace the former Tensed Sentence Constraint to account for the ungrammaticality of this type of sentences.

3. Conclusion

At the beginning, we tried to solve ECM verb structure problems through two ways. First, anaphors in ECM structure will have subject-to-object raising phenomenon. Subject anaphors in nonfinite embedded clause will raise to the specifier of the AgrOP for case reason, so it moves out of its original position in CP. The new binding domain of anaphor will have a co-indexed antecedent which c-commands it, so the sentence is grammatical. Next, we redefine the definition of binding domain. Binding domain of anaphors must contain an XP, where the head X governs and gives case to them. What prevents anaphor subject in finite embedded clause from being governed by matrix ECM verb is CP barriers. In contrast, since anaphor subject in nonfinite embedded clause cannot get a case, ECM verbs then will resolve this CP barrier and exceptionally give case to embedded subject, namely anaphor. However, these two ways cannot explain anaphors in the complex DP. Therefore, further explanation was provided. Based on Chomsky's notion, in order for a subject to count as an "accessible" subject (antecedent) for an anaphor, it must meet the following requirement. Firstly, an anaphor must be in the c-command domain of the antecedent. Secondly, potential antecedent and anaphor cannot violate i-within-i condition. Therefore, the final version of Binding Principle A will be: one copy of an anaphor in a chain must be bound within the smallest CP or DP containing it and the first potential antecedent. In other words, if we have an embedded clause where the anaphor is in the subject, the smallest CP containing a subject is the binding domain. This means that a DP can bind an anaphor in an finite embedded clause if that anaphor is inside the subject position. Lastly, we also check if the DP trace could follow the Binding Condition. DP traces occur at the two major DP-movement transformations, namely *passivization* and *raising*. In both transformations, the trace is always co-indexed and c-commanded by its antecedent in the argument position. Thus, DP trace is regarded as an anaphor in nature and actually obey Principle A.

3.1 Pedagogical Implications

Based on the findings in the present project, there are three pedagogical implications could be concluded. First

of all, these findings could provide EFL teachers with more professional knowledge toward English anaphors. As EFL teachers, they are able to judge the grammaticality of the usages of English anaphors. In English, whether the antecedents bound the anaphors or not depend on the construction of the sentence. Therefore, with this further understanding of the English anaphors, it is good for teachers to deepen their English proficiency. Second of all, EFL teachers might be able to help students judge the grammaticality of the usages of English anaphors as well. In English, the difference of finite and nonfinite structures may pose a hurdle for Taiwanese EFL learners to acquire correct English anaphors. As a result, EFL teachers might be able to come up with teaching techniques or teaching materials. Third, there should be universal rules to account all possibilities according to the concept of syntax. Based on the findings of this current project, issues proposed are solved properly, and the Principle A of the binding theory is revised. Comparing with the previous versions, the new or revised versions are more complete and able to account what the previous ones cannot.

3.2 Limitations

There are two limitations of this present project. First of all, this present project aimed to solve some issues of binding theory accounting for English anaphors. However, the limited discussion of one language becomes a problem. Since the syntactic rules should account for all languages, more languages are needed to be examined and discussed. Taking Chinese as an example, the sentence "張三發現李四喜歡他自己." The Chinese anaphor "他自己" could either be the subject of the matrix clause "張三" or the subject of the embedded clause "李四". According to the findings of the present project, this somehow violates Principle A, which says that there is a CP barrier, so it is impossible for the anaphor to co-referential with the external DP or antecedent. However, it is not the case. Second, the complexity of the sentence structures might create some new issues. Due to the limited discussions on finite versus nonfinite, subject accessibility, and tracing, there are still some aspects that are not covered. Taking English wh-movement for an example, how binding theory could account for wh-movement's grammaticality becomes an issue.

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