

The ties that bind: The need for syntax in binding theory

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1 Introduction

The syntactic behaviour of nominal expressions in natural language is an intriguing phenomenon. Anaphoric expressions and reflexive pronouns, such as *himself*, and reciprocals, such as *each other*, are dependent on other expressions – an antecedent – for their interpretation. Ordinary pronouns such as *him* and *her* sometimes depend on other expressions for interpretation, but not always. Language users, including young children, have detailed knowledge of the linguistic principles that govern the interpretation of the full range of nominal expressions, including lexical noun phrases, ordinary pronouns, as well as reflexive and reciprocal pronouns (e.g., see Crain and Thornton 1998; Crain, Koring and Thornton, to appear).

Consider the examples in (1). Native speakers of English can readily determine the antecedents of the ordinary pronouns and reflexive pronouns in examples such as these, despite the apparent complexity of this process.

- (1)
- a. John_i loves himself_i
 - b. John_i loves him_k
 - c. John_i thinks that Bill_k loves himself_k
 - d. John_i thinks that Bill_k loves him_i

Specifically, all English speakers know that *John* can be the antecedent of the reflexive pronoun *himself* in (1)a, but cannot be the antecedent of the ordinary pronoun *him* in (1)b. English speakers also know that the pattern of interpretation reverses in (1)c and (1)d, such that *John* cannot be the antecedent of *himself* in (1)c, but *John* can be the antecedent of *him* in (1)d.

Chomsky (1981, 1986) proposed principles of binding that, taken together, accounted for a vast array of linguistic phenomena, both within and across languages, including examples such as those in (1). The canonical binding theory proposed by Chomsky was comprised of three principles - A, B and C. Principles A and B are stated in (2), and these two principles accounted for the distributional facts in (1). The meanings of the terms *bound*, *free* and *local domain* will be explained as we proceed.

(2)

- a. (A) An anaphoric expression must be bound in its local domain
- b. (B) A pronominal expression must be free in its local domain

Investigation into the properties that govern the distribution and interpretation of anaphoric expressions remains one of the central topics of formal linguistics (e.g. Hicks 2009, Heinat 2005, Safir 2004, Rooryck and Vanden Wyngaerd 2011, Reuland 2011, Sportiche 2013, Volkova & Reuland 2014), as such phenomena provide a probe into the nature and structural properties of the faculty for language. Binding theory has achieved impressive empirical success in describing the distributional properties and interpretation of nominal expressions both within and across languages. Research in this domain revealed important structural features of human language, including the structural notion of c-command which has proven to underpin many disparate-looking linguistic phenomena (see Reinhart 1976).

As cross-linguistic research in binding phenomena has progressed, however, linguists have documented anaphoric systems in many languages that fall outside the canonical binding theory (henceforth CBT). Hence, though the canonical binding theory proposed by Chomsky (1981, 1986) represented a substantive achievement in linguistic theory, it is now widely considered to be empirically inadequate and, therefore, researchers have proposed modifications to the theoretical principles of CBT (e.g. Reinhart & Reuland 1993, Reuland 2011, Safir 2004, Pollard and Sag 1992, Rooryck and Vanden Wyngaerd 2011). These changes in theory were simply indicative of a field that was thriving, and even substantive changes have not undermined the profound insights of the original binding theory. That is, the fundamental idea that there are language-specific

structural conditions on binding has not changed. One goal of current research is to investigate whether the syntactic constraints on binding can be derived from more general properties of the human language faculty, such as agreement for instance (e.g., see Reuland 2001, 2011, Reuland & Everaert 2010, Heinat 2005, Hicks 2009, Rooryck and Vanden Wyngaerd 2011).

Recently, the conclusion that there are language-specific, structural, conditions on binding has been challenged. It has been argued that the phenomena that binding theory was designed to account for are better explained by posing domain general cognitive constraints. From this alternative perspective, language specific structural properties do not govern the interpretation of lexical NPs, ordinary pronouns, and reflexive and reciprocal pronouns.

One such proposal is advocated by Ambridge, Pine, and Lieven (2014, henceforth APL). According to APL, “the facts attributed to the binding principles reduce to a very simple functional explanation” (Ambridge et al. 2014: e80). The approach adopted by APL appeals to cognitive mechanisms such as precedence, discourse prominence, and pragmatic strategies. APL claim that these discourse mechanisms and pragmatic principles are all that the language learner requires to converge on a grammar that is equivalent to that of adult speakers. Importantly, according to APL, there are no innate language-specific principles that guide the child in the acquisition of constraints on the interpretation of anaphoric relations. Despite these strong claims, however, APL do not indicate how the proposed discourse and pragmatic principles are acquired by child language learners. Neither do they demonstrate that the pragmatic principles are not language-specific.¹ Therefore, the response we will be offering to APL’s account of binding is limited to an evaluation of the empirical adequacy of the APL account of the conditions on binding (see Crain, Koring and Thornton (forthcoming) for extensive discussion of findings from empirical research on child language acquisition that challenges the kind of approach taken by APL).

¹ APL contend that the principles they propose are cognitively general and more natural than the language specific structural conditions on binding proposed by generative linguists. However, it is far from clear that notions such as information structure, topic/focus, *etc.* are cognitively general. Such notions are not operative in the domain of vision for example.

Of course a structural account of binding, such as the canonical binding theory (CBT) does not preclude discourse factors from exerting an influence on anaphoric dependencies. It is well known, for example, that discourse factors affect the extent to which referents are accessible as the antecedents of pronouns (Ariel 1990). APL make the particularly strong claim, however, that discourse-functional constraints suffice to explain the “entire pattern of (the) data” (p. e79/e81). In fact, they claim that the discourse-functional constraints they propose cover *more* data, since “there are [...] cases where only discourse-functional principles offer satisfactory data coverage” (APL e80). If APL are right, language-specific structural constraints are redundant at best.

We will show that the conclusions drawn by APL do not hold up to careful scrutiny. It turns out that, upon close inspection, the domain general discourse mechanisms and pragmatic principles that APL propose fail to account for a range of binding phenomena. In fact, the empirical coverage of APL’s account of binding is extremely limited, as compared to the available language-specific accounts.² As we document, APL’s discourse-functional account does not even provide an adequate account of several of the most basic generalizations that have been repeatedly confirmed in cross-linguistic research. As a final introductory comment, the arguments we make, as well as the conclusions these arguments invite, are intended to apply more generally to any approach that attempts to account for binding phenomena using domain general constraints. We discuss Principle C first. Then we turn to Principles A and B.

² The format of our response to APL is parallel in many respects to the response by Schütze et al. concerning the application of the Subjacency constraint on *wh*-questions.

2 Principle C

Principle C is a syntactic generalization that accounts for the distribution and interpretation of lexical noun phrases.³ For example, Principle C constrains the coreference possibilities between the lexical NP, *Sarah*, and the pronoun, *she*, in example (3), an example taken from APL.

(3) *She_i listens to music when Sarah_i reads poetry

As shown in (3), the pronoun *she* cannot be assigned the same index as the lexical expression *Sarah*; hence, these nominal expressions cannot be assigned coreference.⁴ As stated in (4), Principle C blocks the coindexation of *she* and *Sarah*. Example (3) constitutes a violation of Principle C because the lexical NP *Sarah* is bound by the pronoun *she*. Expressions with different indices have different referents, so Principle C dictates that the pronoun *she* has direct reference – it refers to some salient female individual in the discourse context, other than Sarah.

(4) *Principle C* (from Reinhart 1976)

X binds Y iff:

- X c-commands Y and
- X and Y are coindexed

³ Principle C also governs the interpretation of Strong Crossover sentences such as *Who does he think is wearing a hat?* This question can be analysed by introducing a variable, *x*, which is bound by the *wh*-word (i.e., *Which person x does he think x is wearing a hat.*). The critical observation is that, on this analysis, the pronoun *he* cannot be anaphorically related to the variable, so the sentence cannot be paraphrased as *Who thinks he is wearing a hat.* This observation led to the intriguing proposal that variables can be R-expressions. In more recent formulations of the phenomena, the variable has been replaced by a (phonetically silent) copy of the *wh*-phrase itself.

⁴ We follow APL and use the term ‘coreference’ to indicate that two NPs are coindexed. Technically, coindexation and coreference are distinct notions. Coindexed NPs are most often, but not always, coreferential, and contra-indexed NPs are most often, but not always, disjoint in reference. However, we will not be discussing cases in which the two notions are distinct, so it is harmless to conflate these notions for the purposes at hand.

A referring expression (R-expression) must be free (not bound) everywhere.

2.1 Is Principle C necessary?

APL suggest that the facts governed by Principle C can be explained in more general terms, without invoking the language-specific structural property of c-command. They say that “[m]ore informally, we can understand principle C (at least for multiple-clause sentences) by saying that a pronoun may precede a full lexical NP to which it corefers only if the pronoun is in a subordinate clause” (2014, p. e75).⁵ APL discuss two conditions under which pronouns and lexical NPs can co-refer. These two conditions are called forward and backward anaphora. For APL, *forward anaphora* refers to coreference in sequences of NPs such as < NP ... pronoun >. They state the following principle governing forward anaphora, which can be illustrated using the sentences in (5):

... forward anaphora, where a lexical NP sends its interpretation forward (left-to-right), is allowed whether the pronoun is in the main or subordinate clause” (APL, 2014, p. e75)⁶

(5)

- a. [_{CP} [_{CP} When Sarah_i reads poetry] she_i listens to music]
- b. [_{CP} Sarah_i listens to music [_{CP} when she_i reads poetry]]

Backward anaphora refers to coreference between NPs that appear in sequences of the form < pronoun ... NP >. APL state the following principle governing backward anaphora, which can be illustrated using the sentences in (6):

⁵ This “more informal” characterization offered by APL is clearly not equivalent to Principle C, because Principle C makes no reference to main clauses or subordinate clauses. We return to this point after we have presented APL’s analysis.

⁶ The examples are taken from Lust (2006, p. 214).

Backward anaphora, where a lexical NP sends its interpretation ‘backward’ (i.e. right-to-left), is allowed only when the pronoun is in the subordinate clause. (APL, 2014, p. e77)

(6)

- a. [_{CP} [_{CP} When she_i reads poetry] Sarah_i listens to music]
- b. *_{CP} She_i listens to music [_{CP} when Sarah_i reads poetry]

APL concede that Principle C of CBT accounts for the constraint on coreference observed in example (6b), but they argue that the generalization expressed by Principle C is spurious. According to APL, Principle C “is successful only to the extent that it correlates with principles of discourse and information structure” (APL, p. e77). We will argue that just the opposite is true – namely that the principles APL propose are successful only to the extent that they correlate with the syntactic principles of binding. We will show, moreover, that their analysis of binding phenomena tacitly presupposes the very linguistic structure that they claim is unnecessary. The tacit inclusion of syntactic structure casts doubt on the conclusion that the principles of binding are domain general.

APL assert that the principles governing the distribution of pronouns and NPs are functional in nature, and that conditions on both forward and backward anaphora reflect a general pragmatic strategy that is not specific to language. Their functional explanation for the conditions on forward and backward anaphora (Principle C effects) is the following:

... the topic/theme is the NP that the sentence is ‘about’, and about which some assertion is made (the comment/focus/rheme). This assertion is made in the predicate of the main clause (e.g. *Sarah listens to music*), with subordinate clauses providing some background information. ... When a particular referent is already topical (e.g. we already know we are talking about *Sarah*), it is most natural to use a pronoun (or null reference) as topic (*She listens to music*). Thus, when speakers use a lexical NP as topic, they do so to establish this referent as the new topic (or, at least, to re-establish a previously discussed referent as the topic of a new assertion). Once they have decided

to use a lexical NP to establish a new topic, it is entirely natural for speakers to use a pronoun in the part of the sentence that provides some background information on this topic. (APL, 2014, p. e77)

Let us see how this account applies to example (6)b above: *[_{CP} She_i listens to music [_{CP} when Sarah_i reads poetry]]. APL argue that the speaker's decision to use the pronoun *she* as the topic indicates that the referent of the pronoun is highly accessible in the conversational context. They reason that, because the referent of the pronoun is highly accessible, it would be pragmatically anomalous to use a lexical NP that is anaphorically related to the pronoun in a part of the sentence that exists only to provide background information, i.e., in the clause ... *when Sarah reads poetry*. APL reason that:

If I (as speaker) am sufficiently confident that you (as listener) know who am I [I am] talking about to use a pronoun as the topic of my main assertion (*She listens to music*), I should be just as happy (if anything, more so) to use pronouns in the part of the sentence that constitutes only background information (*when she reads poetry*). The only plausible reason for my use of a full lexical NP in this part of the sentence would be to identify a new referent. (APL, 2014, pp. e77-e78.)

APL conceive of the pragmatic structure of a sentence the following way:⁷

Most utterances have a TOPIC (or theme) about which some new information (the ***focus***, comment, or rheme) is asserted. In a basic declarative sentence, the *topic* is usually the subject.

Bill bought a book

The ***potential focus domain*** is the predicate phrase, and, under the default interpretation, is the ***actual focus*** as well (Bill ***bought a book***, rather than, say, ***ran a marathon***). However, provided that a cue such as vocal stress is used to overrule this default interpretation, the ***actual focus*** can be anywhere within the ***potential focus domain***

⁷ APL's notation is as follows: *italics* refers to the topic, ***bold italics*** refers to the potential focus domain, ***bold italics with underlining*** refers to the actual focus.

- | | |
|-------------------------------------|--|
| a. <i>Bill <u>bought</u> a book</i> | (He didn't steal or borrow one) |
| b. <i>Bill <u>bought a</u> book</i> | (He didn't buy two books, <i>et cetera</i>) |
| c. <i>Bill <u>bought a book</u></i> | (He didn't buy a newspaper) |

2.1.1 Topic vs. Subject

According to APL's functional explanation of Principle C effects, topicality is the sole factor that governs the distribution of pronouns. In the four examples that APL provide it is plausible to consider the subject of the matrix clause to be the topic of the sentence. This is why APL's functional explanation succeeds in cases like (6)b: if something is topical and licenses a pronoun, then their functional explanation applies.

Is it plausible to suppose that **only** *topicality* constrains coreference between a pronoun and a lexical NP, with no further restrictions? In simple sentences, the subject is often the topic. Consider the examples in (7). In (7)a *John* is the topic of the sentence, whereas *The police* appears in subject position in the passive sentence (7)b and it becomes the topic.⁸

- (7)
- | |
|-------------------------------------|
| a. John called the police |
| b. The police were called (by John) |

Although subjects are frequently topics, the correlation between grammatical subject and topic is far too complex to support the supposition that only the subject can be what the sentence is about. In English, topicality is not restricted to one grammatical function, the subject of the sentence. The pedestrian examples in (8) illustrate the implausibility of conflating the subject with the topic.

⁸ This kind of passive structure (e.g., *Mistakes were made*) is commonly found in news reports when the agent is irrelevant: *Police were called last night to a disturbance at the Slug and Lettuce*. There is no indication of who called the police because this fact is not relevant to the discourse, as compared to the disturbance that required the police. For this reason, we are inclined to say that *the police* is the topic. This does not mean, however, that passivization and topicalization can be conflated (see Keenan and Dryer 2006).

- (8)
- a. Something is wrong with my baby.
 - b. In space, nobody can hear you scream.
 - c. It is time to do your homework.
 - d. There seems to be a man in the garden.
 - e. Close tabs were kept on the students.
 - f. The remaining questions, John simply skipped.

In (8)a the grammatical subject is *something*, but the sentence isn't about *something*, rather the sentence is about *my baby* and my comment is that she is ill. Similarly, in (8)b *nobody* isn't what the sentence is about; the sentence is about the poor quality of the audio in outer-space. In (8)c and (8)d the grammatical subject is an expletive, which lacks inherent meaning, so it cannot possibly be a topic. (8)e is part of an idiom and has no independent meaning and (8)f topicalizes the object *the remaining issues*.⁹ In short, English does not grammatically indicate what the topic of a sentence is, and subjects are not necessarily topics. That is, there is no one-to-one relation between the grammatical subject and the topic of a sentence. This undermines APL's suggestion that the *topic* is "the NP that the sentence is 'about' ..." (e77) and that "the topic is usually the subject" (e72). To be sure, subjects are often topics in English, as APL state. However, the functional principle proposed by APL, topicality, applies to *all* grammatical positions. It is simply mistaken to conflate topicality and subjecthood, as we just saw.¹⁰

What does the APL account achieve by restricting the topic to the grammatical subject? We contend that the APL account succeeds as a replacement for Principle C because, by limiting the topic to the subject position, the account manages to smuggle in a syntactic condition, making APL's pragmatic constraint appear to be more empirically adequate than it would be otherwise, i.e. if the syntactic condition were removed. That is,

⁹ We note that in English we can use the *As for ...* construction as a diagnostic for a constituent being a topic. Thus, we can have (1) below:

(1) As for the remaining questions, John skipped them

But not (2):

(2) *As for something/nobody/it/there/close tabs, ...

¹⁰ The discussion in this paragraph draws on discussions in Huddleston (1984, pp. 58-72) and Huddleston and Pullum (2005, p. 70).

by restricting the application of the ‘functional’ condition on anaphora to a *structural* position (i.e. the subject position), this guarantees that the pronoun will c-command a lexical NP that appears later in linear sequences of the form < pronoun ... NP > (making it look like Principle C). To the extent that APL’s analysis succeeds, therefore, it is because they are tacitly imposing a syntactic restriction. To illustrate, consider sentence (9) where the pronoun is not in the subject position.

(9) [[When John_i arrived] someone gave his_i mother a call]

The topic in (9) is the lexical NP, *John*. The topic is introduced in a subordinate clause and licenses the possessive pronoun *his* in the main clause. Notice that the pronoun is not the grammatical subject of the main clause. In (9), the predicate phrase (... *gave his mother a call*) is not predicated of *John*, but is being predicated of *someone* (other than *John*). Thus, the condition on pronoun licensing by the topic phrase is not limited to grammatical subjects. The condition on licensing in (9) is completely consistent with APL’s claim that a salient referent is understood to be the topic, and that this salient referent licenses the use of a pronoun – “when a particular referent is already topical (e.g. we already know we are talking about *Sarah*), it is most natural to use a pronoun (or null reference) as topic (*She listens to music*)” (p. e77).¹¹ As example (9) illustrates, the licensing condition of salience is *not* unique to grammatical subjects. A pronoun in many grammatical positions can be licensed via a salient referent.

Consider example (10), with the lexical NP *Sarah*. Once *Sarah* is established as the topic, by Speaker A, Speaker B can use a pronoun that is anaphorically linked to *Sarah*, where the pronoun can serve three different grammatical functions.

(10)

a. Speaker A: Did you hear from Sarah?

¹¹ APL acknowledge that this reasoning makes forward anaphora from a subordinate clause to a main clause, as in (5)a above, “[a]n exception to this backgrounding account” (APL, 2014, p. e78). This means that APL can only explain three out of their four examples, where CBT can explain all four of APL’s examples.

Speaker B: Yeah, her mother introduced her boyfriend to her cousin.

b. Speaker A: Did anyone call Sarah?

Speaker B: Yeah, John called her.

APL are correct to assert that pronouns are licensed “when a particular referent is already topical ...” (e77). However, the pragmatic principles governing the introduction of pronouns are not in any way restricted to *subjects*. As the examples in (9) and (10) demonstrate, topical NPs do not have to be subjects, and subjects do not have to be topics. Identifying the topic simply depends on the context in which the sentence is uttered.

It is clear that the usage of pronouns is related to topicality. As comprehensively documented by Ariel (1990), there is an inverse relation between the descriptive content of a referring expression and what she calls the accessibility of the discourse referent. The more prominent an element is in the discourse, the more accessible it is, where prominence can be measured, for example, by textual distance. Whenever the last mention of a discourse referent is sufficiently distant from one that is forthcoming, a full lexical NP or proper name will be used. If a discourse referent is sufficiently high on the scale of accessibility, a pronoun is preferred. The use of pronouns is governed by a simple measure of textual distance, or accessibility, in the discourse. It is not limited to subject position or the position of the topic.

Ariel’s notion of accessibility appears to be consistent with APL’s notion of topicality and we will henceforth assume that something like this is what APL mean by topicality. APL assert that “... it makes pragmatic sense to use a lexical NP ... as the topic about which an assertion is made, and a pronoun in a part of the sentence containing information that is secondary to that assertion, but not vice versa” (APL, 2014, p. e78). Of course, topicality and topic often coincide, but they need not. For example, they are distinct in the sentences in (11).

(11)

- a. His_i brother likes Mary
- b. Mary_i put her_j in the team

The pronouns in (11) are highly topical, but the pronouns are not the topic/theme, or what the sentence is about, in either sentence. By restricting their discussion to example sentences in which the grammatical subject is the topic, APL introduce a structural property (grammatical subject) into their analysis, despite explicitly disavowing structural properties. This unmotivated restriction tacitly re-introduces c-command into the APL account. By limiting the condition on anaphora to the subject position, APL ensure that a pronoun in this position c-commands the ‘lower’ lexical NP and, hence, the two expressions must be disjoint in reference, due to Principle C of the canonical binding theory. Recall APL’s condition on backward anaphora:

Backward anaphora, where a lexical NP sends its interpretation ‘backward’ (i.e. right-to-left), is allowed only when the pronoun is in the subordinate clause. (APL, 2014, p. e77)

(12)

- a. [_{CP} [_{CP} When she_i reads poetry] Sarah_i listens to music]
- b. * [_{CP} She_i listens to music [_{CP} when Sarah_i reads poetry]]

Although APL do not state it this way, it is clear that this restriction on backward anaphora is intended to be biconditional. So the condition could be paraphrased as the assertion that backward anaphora is possible *if and only if* the pronoun is in the subordinate clause. In other words, APL’s condition on backward anaphora maintains that co-reference is allowed *only* when the pronoun is in the subordinate clause. But this is problematic because, as a matter of fact, subordinate clauses are not necessary ingredients for backward anaphora.

To see this, consider the examples in (13). None of the pronouns in the examples in (13) are contained in a subordinate clause. Therefore, APL's constraint on backward anaphora does not apply to these examples.

(13)

- a. [CP [NP His_i mother] thinks [CP that Bill impounded John_i's car]]
- b. [CP [NP That picture of him_i] encouraged *The Times* [CP to badger the president_i]]
- c. [CP [NP His_i mother] thinks [CP she bothered John_i]]
- d. [CP [NP Rumours about her_i] forced Mary [CP to apologize to every philosopher_i]]

Thus, APL's condition fails to predict the coreference possibilities that are observed in (13). By contrast, standard formulations of Principle C account for the coreference patterns witnessed in (13) because the pronoun does not c-command, and therefore does not bind, the lexical NP it is coindexed with. The examples in (13) show that co-reference between the pronoun and lexical NPs does not depend on the pronoun occurring in a 'backgrounded' subordinate clause.

APL's biconditional fails in the other direction as well. To see this, it suffices to establish that disjoint reference can obtain between a pronoun and a lexical NP that appears in a preceding subordinate clause. The examples in (14) make the case. In (14)a, the subordinate clause *which paper that he gave to Ms. Brown* contains the pronoun *he*, which can be bound by the subject quantificational NP *every student*, and the lexical NP *Ms. Brown*, which can be co-indexed with *she*. This pattern is consistent with APL's condition on backward anaphora. However, in (14)b, *he* cannot be bound by the quantificational expression *every student* when *Ms. Brown* and *she* are co-indexed. Thus, backward anaphora is not possible in (14)b despite the fact that the pronoun *he* remains in the subordinate clause.

(14)

- a. [CP [CP Which paper that he_i gave to *Ms. Brown*_j]_k did every student_i hope t_k that *she*_j would read t_k?]

- b. * $[_{CP} [_{CP}$ Which paper that he_i gave to *Ms. Brown*] $_{k}$ did she_j hope t_k that every student $_i$ would revise t_k ?]

(Lebeaux 1990)

APL's condition on backward anaphora states that backward anaphora is allowed when a pronoun is in a subordinate clause. Thus, we would expect such a co-indexing to be possible in both sentences in (14), contrary to fact. Importantly, the difference in acceptability of coreference in the (a) vs. (b) sentences cannot be accounted for by an explanation that restricts itself to the surface order. The contrast follows naturally, however, if we take the hierarchical structure of these sentences into account.

In the examples in (14), the complex *wh*-phrase originates as the direct object of the verbs *revise* and *read* in the embedded clauses (indicated with t_k). It is empirically well-attested that *wh*-movement in English operates in successive cycles, leaving a trace/copy in each clause that it moves through. This means that there are three instances of the *wh*-phrase in both (14)a and (14)b (here marked as t_k in both examples). The binding possibilities follow from the structural relations between the pronouns and the potential antecedents in each of these positions. Let's illustrate how this accounts for the contrast in acceptability between (14a) and (14b). In (14)a *every student* is able to bind *he* when the *wh*-phrase is reconstructed to the intermediate position (t_k immediately after *hope*). In this position, the *wh*-phrase is structurally lower than *every student* (enabling a binding relation), but structurally higher than *she*. *Ms. Brown* will therefore not c-command *she*, thus allowing *Ms. Brown* and *she* to be co-indexed. In (14)b on the other hand, binding of *he* by *every student* would require reconstruction into the complement of *revise* (the only position that is structurally lower than *every student*). In this position, *she* would c-command *Ms. Brown*, therefore inducing a Principle C violation, resulting in the ungrammaticality of the indexing in (14)b.

The contrast in (14) demonstrates that the binding principles interact with other syntactic principles, in this case movement. APL's pragmatic principles are restricted to the surface structure of the sentence and thus cannot account for the contrast in (14). A similar observation reveals itself in the contrast in (15).

(15)

- a. [Which claim that he_i had made about $Maggie_j$] did she_j expect every senator_k to reject < ~~which claim that he_i had made about $Maggie_j$~~ >
- b. [~~Which claim that he_i had made about $Maggie_j$~~] did she_{*j} expect every senator_i to reject < which claim that he_i had made about $Maggie_j$ >

For the point we are making, the relevant contrast between (15)a and (15)b is the indexing.¹² In (15)a, the masculine pronoun *he* is not co-indexed with *every senator* (but refers to another male entity), whereas the lexical noun phrase *Maggie* is co-indexed with the feminine pronoun *she*. In (15)b, however, the pronoun *he* is co-indexed with the quantifier phrase *every senator* (both carry index *i*), and in this case, coindexation (hence, coreference) between *Maggie* and the feminine pronoun *she* is not acceptable. The reason for this contrast in indexing possibilities depends on whether or not the masculine pronoun *he* is bound by the quantificational expression *every senator*. If the *wh*-phrase is interpreted in its surface position, as in (15)a, the pronoun *he* cannot be bound by *every senator* because *he* appears in a higher position than *every senator* in the syntactic structure. In this position, the feminine pronoun *she* does not c-command the lexical NP *Maggie* so coindexation (and coreference) between *she* and *Maggie* is permitted. If the *wh*-phrase is reconstructed to a lower position, as in (15)b, it becomes possible for *every senator* to bind pronoun *he*. In this position, however, the pronoun *she* c-commands *Maggie* – so coindexing is prohibited by Principle C.

APL's condition on backward anaphora does not predict, nor does it explain the contrast witnessed in (15). In (15) the masculine pronoun *he* occurs in a subordinate clause and APL's condition predicts that backward anaphora from *every senator* should therefore be allowed. However, coindexing of *every senator* and *he* makes it impossible to coindex the pronoun *she* and the lexical NP *Maggie*. It is not the case that coreference

¹² Of course, in (15) above the pronounced form is *which claim that he had made about Maggie did she expect every senator to reject?* The notation in (15) reflects the position where the *wh*-phrase is interpreted. Notating the *wh*-phrase with its copy allows the reader to see the interaction between the binding principles and the position at which the phrase is interpreted.

between *she* and *Maggie* is ruled out because *Maggie* resides in a subordinate clause. If *every senator* and *he* are not co-indexed, coreference between *Maggie* and *she* is permissible. It follows, therefore, that the contrast exhibited by the examples in (15) does not follow from APL's pragmatic account.

APL might object that the pronouns in (13), (14) and (15) are not the topics of the sentences that contain them and that, therefore, their pragmatic principles do not apply to these examples. However, APL's precise condition on backward anaphora *does not* restrict the principles governing pronouns and lexical NPs to topics.¹³ Rather, APL simply state that backward anaphora is possible if the pronoun is in a subordinate clause. Thus, for APL, coindexation of the relevant expressions in (13), (14) and (15) should be impossible, contrary to fact. Alternatively, APL could claim that the pronouns in (13), (14) and (15) are not visible to their pragmatic principles, because these pronouns reside inside subjects and the head noun is "... the NP that the sentence is 'about' [the topic]" (p. e77). Again, such a manoeuvre simply imposes the equivalent of a structural constraint on backward anaphora.

It is important to note in addition that pronominal reference is often *not* simply a matter of selecting a salient referent. As we have already seen, pronouns can be analysed as bound variables in certain linguistic environments. Consider the examples in (16).

(16)

- a. *None of the boys_i came. He_i was tired
- b. None of the boys_i told the teacher that he_i would come to school

In (16)a the pronoun that begins the second sentence cannot be bound by the NP that precedes it in the first sentence. But pronominal binding is possible in (16)b. The contrast between (16)a and (16)b shows that variable binding is distinct from coreference. Notice, in this regard, that it makes no sense to say that quantified NPs such as *none of the boys* are referring expressions, since there is nothing for them to refer to. This raises a serious problem for APL's analysis, because there are many linguistic structures in which

¹³ APL's *justification* of their conditions on backwards anaphora does restrict their principles to topics but that leaves us with no explanation of the distribution of pronouns and lexical NPs that are not topics.

pronouns precede quantifiers in the surface syntax, but are bound by them at the level of semantic interpretation. All of the examples in (17) are instances of backward anaphora, with quantificational NPs, rather than referring expressions.¹⁴

(17)

- a. [Which of his_i pictures] persuaded the museum that every artist_{*i/j} paints flowers?
- b. [Which of his_j pictures]_i did they persuade the museum that every artist_j likes t_i best?
- c. [In his_j barrel]_i, every pirate_i put a tennis ball t_i.
- d. It is [her_j pig] that every girl_j likes t_i best.

A bound variable reading is not accessible in (17)a, but it is conspicuously accessible in (17)b. That is, a possible answer to (17)b could be *his first picture*. By answering the question in this way, *the* pictures in question co-vary with their artists. However, this interpretation is not available for the question (17)a, despite the structural similarity of (17)a and (17)b. Similarly, (17)c and (17)d demonstrate pronominal binding of the kind that seen in (17)b. More specifically, example (17)c is a case of preposition preposing (Topicalization), and (17)d is a cleft structure. A structural account provides a very straightforward analysis of such phenomena. In, (17)b, c, and d, the constituent that contains the pronoun is reconstructed to a position in which it is c-commanded by the quantificational NP at the level of semantic interpretation, such that it is bound by the quantificational NP. That is, the underlying structure of these sentences provide the configurations that are necessary for the quantifier to bind the pronominal expression. The crucial difference between (17)a and (17)b is the semantic role that is played by the constituent [*which of his pictures*], where the semantic role is determined by the underlying structural position of the constituent, In(17)a, the question phrase [*which of*

¹⁴ We thank Noam Chomsky (p.c.) for pointing out examples a. and b. Examples c. and d. are taken from experimental studies of child language demonstrating that children as young as 3-years-old know that pronouns can be bound by quantificational expressions that come later in the surface syntax (Guasti and Chierchia 2000; Kiguchi and Thornton 2015). This linguistic phenomenon is known as reconstruction.

his pictures] is the external argument of *persuade* (the cause of the persuasion), whereas in (17)b, the question phrase [*which of his pictures*] is the direct object of *likes*. As the direct object of *likes* (position t_i), the *wh*-phrase that contains the pronoun *his* is c-commanded and can be bound by the quantificational NP *every artist*. In all of these examples, moreover, the pronouns appear in discourse structures, so one would expect pragmatic conditions to apply to the examples, but they clearly do not. APL’s condition on backward anaphora provides no explanation for the contrasts above.

This completes our consideration of sentences with multiple clauses. APL assert that “[f]or single-clause sentences, the discourse-functional explanation is even simpler (though, of course, there is no backgrounded clause). If a pronoun is the topic, the referent is highly accessible, which renders it anomalous to use a lexical NP “ANYWHERE within the same clause” (APL, 2014, p. e77). Of course, if a pronoun is used as topic/subject both Principle C and APL’s functional explanation prohibit an anaphoric relationship. However, once again, APL’s theory is silent on examples like those in (18).

(18)

- a. [_{NP} His_i mother] impounded John_i’s car
- b. [_{NP} That picture of him_i] tormented the president_i
- c. [_{NP} His_i mother] bothered John_i
- d. [_{NP} Jokes about her_i] amused every philosopher_i

Strict application of APL’s principles shows that they do not provide an adequate empirical coverage of some of the most straightforward data. APL might argue that the licensing factor for pronouns is accessibility/topicality alone – “when a particular referent is already topical ... it is most natural to use a pronoun (or null reference)” (2014, e77), and that subordinate clauses are not necessary conditions. However, in the examples in (18), the pronouns can similarly be licensed by high topicality *and* can be co-indexed with a subsequent lexical NP. Nothing in APL’s theory explains why this is possible. In short, topics/subjects clearly have nothing to do with these binding relationships because such relationships hold of objects as well, as illustrated in (19).

(19)

- a. John put his_i mother on Bill_i's table
- b. *John put him_i on Bill_i's table

APL's condition on forward anaphora fares little better. Recall the condition they propose:

... forward anaphora, where a lexical NP sends its interpretation forward (left-to-right), is allowed whether the pronoun is in the main or subordinate clause" (APL, 2014, p. e75)

This condition accounts for the sentences in (20).

(20)

- a. [_{CP} [_{CP} When Sarah_i reads poetry] she_i listens to music]
- b. [_{CP} Sarah_i listens to music [_{CP} when she_i reads poetry]]

But the condition fails to account for the famous sentences in (21).¹⁵

(21)

- a. *[[Which claim that John_i is nice] did he_i believe?]
- b. [[Which story that John_i wrote] did he_i like?]
- c. *[[Which claim that John_i was asleep] did he_i later deny?]
- d. [[Which claim that John_i made] did he_i later deny?]
- e. *[[The claim that John_i was asleep], he_i won't discuss]

¹⁵ These constructions are discussed extensively in Lebeaux (2009) *Where does Binding Theory Apply?* In these constructions, certain instances of A-bar-movement do not bleed Condition C violations (see also Van Riemsdijk and Williams 1981, Friedin 1986, Lebeaux 1988). The phenomenon provides a robust contrast as we see in Lebeaux's pair below:

(3)

- a. [Which argument that John_i made] did he_i believe?
- b. *[Which argument that John_i is a genius] did he_i believe?

- f. [[The claim that John_i made], he_i won't discuss]

The examples in (21) contain clause initial subordinate clauses, just like example (20)a did. We would therefore expect APL's condition on forward anaphora to apply to these examples as well. Although the pronoun is in the main clause and the lexical NP is in the subordinate clause, forward anaphora is only available in (21)b, (21)d, and (21)f. APL's condition on forward anaphora predicts that *all* the examples in (21) should allow forward anaphora, contrary to fact. On the other hand, there are also multiple examples in which APL's condition on forward anaphora would allow coreference between a lexical NP and a pronoun, contrary to fact. Representative examples are given in (22).

(22)

- a. *[_{CP} [_{NP} Which picture of John_i] did he_i like?]]
- b. *[_{CP} [_{NP} Which picture of John_i] did Mary think [_{CP} that he_i would like?]]
- c. *[_{CP} John_i believes [him_i to be the best candidate]]
- d. *[_{CP} John_i promised the boys [to be nice to him_i]]
- e. *[_{CP} Everyone_i's mother thinks [that Bill impounded his_i car]]

To conclude, in this section, we demonstrated that APL's discourse-functional conditions for forward and backward anaphora are empirically inadequate. We conclude therefore, that the CBT principles of binding cannot be reduced to the pragmatic principles proposed by APL. Far from accounting for "... all of the cases normally attributed to principle C" (APL, 2014, p. e78), APL's conditions prove to have quite narrow empirical coverage.¹⁶

¹⁶ APL argue that their functional principles also explain strong crossover effects, as illustrated in example (4)

- (4) *Who_i did he_i say Ted criticized?

APL argue that coreference between the pronoun and the wh-phrase is blocked in (4) for the same reason that coreference is blocked in the declarative sentence *He_i said Ted criticized Bill_i. i.e., because the pronoun is the topic. But this leaves us at a loss to explain why coreference is possible in (5), where the pronoun is inside the topic phrase, but fails to c-command the R-expression that follows

To the extent that APL succeed in replacing CBT by their discourse-based binding principles, this is due to the fact that they restrict attention to examples in which a pronoun resides in the subject position. By focussing on this narrow set of examples, APL's binding principles substantially is largely co-extensive with the syntactic principles of binding. Once a larger set of examples is considered, however, the overlap between APL's principles and those of the syntactic binding theory is reduced, leading to a corresponding reduction in the empirical adequacy of APL's account. APL pursue a similar pattern of argumentation, based on an unrepresentative sample, in their discussion of Principles A and B, to which we now turn.

3 Principles A and B

3.1 A discourse-functional principle

In an attempt to account for the linguistic phenomena that are governed by the syntactic binding principle A, APL appeal to the discourse-functional principle in (I). According to APL, principle I successfully replaces a syntactic binding principle in empirical coverage and, moreover, accounts for a greater number of facts.

- (I) "Reflexive pronouns are used in English if and only if they are direct recipients or targets of the actions represented by the sentences" (Kuno 1987: 67, quoted in APL 2014, p. e80).

Contrary to APL's claim however, principle I is far from empirically adequate. For example, it fails to account for the acceptability of simple sentences with reflexive pronouns, such as *himself* in (23).

(5)

- a. The picture of her_i brother torments Mary_i
- b. Who_i did the picture of her_i brother torment?

(23) John_i only trusts himself_i

Since the verb *trust* is used in (23), no action is mentioned, so the occurrence of the reflexive is unexpected according to principle (I). Obviously, counter-examples like this are all too easy to come by.

APL cite Kuno (1987) as the source of principle I. However, Kuno's constraint on the distribution of reflexive pronouns is far superior to principle I. Kuno (1987) formulated two variants of the constraint, and the second variant is much more nuanced than principle I. Here is the second version of Kuno's constraint:

“reflexives with clause-mate antecedents require that their referents be targets of the actions or mental states represented by the verb-phrase” (Chapter 4, p. 153).

In contrast to principle I, this constraint includes two structural notions - clause-mate and verb-phrase - and it also encompasses verbs that express mental states, in addition to verbs that describe actions. So Kuno's constraint pertaining to reflexive pronouns accounts for the acceptability of (23), in contrast to principle I. By including a clause-mate condition, Kuno, but not APL, is also able to account for the unacceptability of sentences like (24) (from Reinhart and Reuland 1993, p. 670).

(24) *Max_i boasted that the queen invited himself_i for a drink

In example (24), the subject *Max* is clearly the “target of the action” represented by the verb *invited*, so the use of a reflexive pronoun should be acceptable in (24), according to APL's discourse-functional principle I. But, as Kuno's formulation of the relevant constraint states, *Max* cannot be anaphorically linked to the reflexive pronoun *himself*, in (24), because these two NPs are not clause-mates. Because the APL version of the principle lacks the structural notion of clause-mate, it fails to rule out numerous unacceptable sentences, including (24). At the same time, as we saw, principle I fails to

rule *in* numerous acceptable sentences, such as (23) because it is restricted to action verbs.

In contrast to APL, Kuno acknowledged the need for structurally-based restrictions on the acceptability of reflexives. He states this explicitly in the concluding chapter: "[i]t has been the aim of this book to show that syntactic and nonsyntactic factors interact, and that both bear on the acceptability of certain structures" (p. 271). Kuno and APL part company because Kuno concludes that both discourse-functional principles and structural notions determine the acceptability of sentences with reflexive pronouns.

Another problem for principle I is that it even fails to rule out clearly unacceptable sentences such as (25), which are correctly ruled out by the syntactic principles of the binding theory and by Kuno's constraint.

(25) *Herself swapped cars with Mary.

According to Kuno's constraint, a reflexive pronoun must be positioned in a verb-phrase. The syntactic binding principle does not mention the verb-phrase, because it contains the more abstract, and far more inclusive structural notion c-command. According to CBT, a reflexive pronoun must have a c-commanding local antecedent. Because APL's principles of binding are solely based on concepts taken from information structure, it eschews structure notions such as verb phrase and c-command. But this means that principle I tolerates reflexive pronouns in all grammatical positions that can be occupied by the targets of the actions. Therefore, principle I fails to prevent reflexive pronouns from appearing in subject position, as in (25).

We have seen that that APL's pragmatic explanation of Principles A, B, and C lacks the empirical coverage of the formal binding in English. However, this brings us to the most serious empirical problem with APL's principles – they only apply to English. The syntactic binding theory was designed to account for facts about binding that are observed in *all* human languages. Applying APL's principles to other languages reveals a broader range of facts that their binding theory cannot handle. The facts that are left

unexplained by APL's proposed discourse-functional principles are even greater in other languages.

3.2. Cross-linguistic principles and variation

Binding phenomena are some of the most intensely studied topics in generative linguistics. Advances in the theory of binding have profited from the extensive investigations of linguistic phenomena that recur in language after language, as well as linguistic phenomena that are language particular. Both cross-linguistic generalizations, and linguistic differences, have been successfully incorporated into the syntactic binding theory, but both these aspects of binding theory resist explanation using APL's information theoretical account of binding.

Important generalizations have been formed based on research on typologically distinct languages.¹⁷ One generalization is that languages tend to use a special marking for reflexivity, although different languages mark reflexivity in strikingly different ways (Reuland 2001, Reuland & Volkova 2014). Any viable theory of binding phenomena must account for the cross-linguistic diversity in marking reflexivity. More importantly, it must account for the cross-linguistic generalization that reflexivity is marked.

3.2.1 Pronouns with local antecedents

Cross-linguistic research has revealed that binding phenomena interact with other components of the grammar, such as movement. The outputs of these interactions sometimes appear to violate certain structural conditions on binding. For example, Everaert (1986) discovered that, in Frisian, a pronoun can take a local antecedent with the verb meaning 'to shame', as illustrated in (27)a. The English counterpart to this sentence

¹⁷ Reuland (2011, p. 9) observes that “[d]uring the 1950s and 1960s we find a divide between linguistic research oriented toward description and research looking for explanation ... In the 1970s, but particularly through the 1980s and 1990s, this divide was bridged. An increasing amount of research was devoted to detailed study of individual languages and the types of variation they exhibit.” This cross-linguistic research imposed an important constraint on linguistic explanation because it demonstrated critical restrictions on variation across languages.

is unacceptable, because the pronoun would be contra-indexed in the English sentence, in accordance with binding principle B. In Frisian, however, a is completely acceptable, where the Frisian pronoun *him* takes its clause-mate NP, *Jan*, as its antecedent. However, sentences with the verb meaning ‘to hate’ are not acceptable with the same pronoun when *Jan* and the pronoun are co-indexed, as (27)b indicates. A reflexive interpretation can only be obtained using a reflexive pronoun, as in (27)c, taken from Reuland (2001).¹⁸

Frisian

(27)

- a. Jan_i skammet him_i
John shames him
- b. *Jan_i hatet him_i
John hates him
- c. Jan_i hatet himsels_i
John hates himself

These facts about reflexivization in Frisian are problematic for APL’s approach. The problem extends to any discourse principle that accounts for the distribution of ordinary pronouns and reflexive pronouns in English. The same account will not work in Frisian. This belies APL’s claim that their account invokes domain general cognitive mechanisms which, presumably, are invariant across the species.

Perhaps cross-linguistic variation in discourse-functional principles could be tolerated by APL, because children could conceivably learn the particular discourse principles of the local language based on differences in linguistic input. However, any account also owes us an explanation about commonalities that are witnessed across

¹⁸ Interestingly, in footnote 20, APL themselves suggest that the same pattern is observed in Old English (see also Van Gelderen 2000). The difference between Frisian and Old English on the one hand and present-day English on the other follows from the (case) properties of lexical items (Hoekstra 1994, Van Gelderen 2000). It is not immediately clear how a discourse-functional approach could handle these facts. If the discourse-functional principle is derived (by children) from the input, then, of course, it could change over time because the child did not receive the relevant input, or misanalysed it. The question then becomes why the principle applies to verb *classes*, if it is acquired on an item-by-item basis, as the usage-based theory contends

languages. By restricting attention to a single language, APL fail to provide us with the kind of discourse-functional principle they seek, one in which “the facts attributed to the binding principles reduce to a very simple functional explanation.” A theory that is restricted to observations about a single language can, at most, achieve a descriptively adequate account for that language. To understand why binding phenomena are the way that they are, and not some other way, any viable account must explain both the deep-seated regularities and the surface differences that are witnessed in typologically distinct languages.

Just such an account was advanced in Reuland and Reinhart (1995), who argued that the facts about Frisian can be reconciled within syntactic binding theory. The observed cross-linguistic variation, according to their account, can be derived from an analysis of Frisian pronouns (see Reuland (2011) for extensive discussion). The distribution of Frisian pronouns can be attributed to two factors. First, Frisian pronouns exhibit special Case marking properties. Second Frisian adheres to general conditions on reflexivity that govern binding across languages. Taken together, what at first appeared to be a violation of a core binding principle can be explained without violating any linguistic principles. It is therefore possible to retain the view that all human languages adhere to the same conditions on binding, with cross-linguistic variation relegated to the lexicon, which is the depository of language specific content. In the generative linguistics literature, relegating cross-linguistic differences to the lexicon is called the Borer-Chomsky conjecture.

Another point of cross-linguistic variation is observed with verbs that take a prepositional phrase as their complement, such as ‘proud of’. Consider examples (28) and (29), from French and Dutch respectively. French and Dutch differ in the type of anaphor that is selected by ‘proud of’. In French, reflexivity is expressed using an ordinary pronoun, as in example (28). By contrast, Dutch requires a reflexive pronoun, as in (29).

French

(28) Jean_i est fier de lui_i

John is proud of him

(Zribi-Hertz 1989)

Dutch

(29) Jan_i is trots op zichzelf/*hem_i

John is proud of himself/him

Again, it would be difficult to explain this cross-linguistic variation by APL's discourse-functional principles. On a purely discourse-functional account, one could hypothesize that speakers of French and Dutch differ in the pragmatic properties of verbs that appear to have the same meaning ('proud of'). Alternatively, one could hypothesize different discourse-functional principles for verbs with similar meanings, in different languages. Neither of these hypotheses is raised by APL. In contrast, as in the case of Frisian, a syntactic binding account has been proposed that invokes structural differences between French and Dutch to explain the limited cross-linguistic variation, without abandoning universal adherence to the conditions on binding (see Reuland 2011). The difference between the syntactic binding theory and the account of binding phenomena proposed by APL is clear. The syntactic theory of binding explains both similarities and differences in binding phenomena across languages. Similarities are attributed to the syntactic conditions on binding and, as far as possible, differences are attributed to idiosyncratic features of lexical items, as supposed by the Borer-Chomsky conjecture. By contrast, APL's discourse-functional principles only pertain to English. In view of this limitation in empirical coverage, APL fall far short of their goal of explaining the "entire pattern of data" (e81).

3.2.2 Reflexive pronouns with non-local antecedents

Chomsky (1986) observed that reflexive pronouns sometimes fail to behave in the way that would be expected by a straightforward application of CBT. According to CBT, the antecedent of a reflexive cannot reside outside the minimal domain of the anaphor (the

local clause).¹⁹ Yet, when we look at languages other than English, we find languages in which reflexive pronouns *can* be anaphorically linked to non-local antecedents. This phenomenon is called “long-distance binding” (Chomsky, 1986, p. 174). These phenomena are the reverse of what we discussed in the previous section, which could be called “local binding”.

Long-distance binding of reflexives is found in Mandarin, Norwegian, and Icelandic, among many other languages. These reflexives are known as long-distance anaphors or long-distance reflexives. Long-distance reflexives can be anaphorically related to an antecedent that resides outside their local domain. Each of the examples in (30-32) illustrates that a reflexive in an embedded clause is linked to the subject of the matrix clause. Because CBT emphasized locality constraints on binding, it proved to be unable to account for the well-formedness of these examples.

Mandarin

- (30) Zhangsan_i zhidao Lisi_j xihuan ziji_{i/j}/ta_{i/*j}
 Zhangsan knows Lisi like SE/him
 ‘Zhangsan knows Lisi likes Zhangsan/Lisi/him’

Norwegian

- (31) Jon_i hørte oss snake om seg_{i/*j}
 Jon heard us_j talk about SE
 ‘John heard us talk about John’

Icelandic

- (32) Jón_i sagð Maríu_j hafa_(inf.) látið mig_k þvo_(inf.) sér_{i/j/*k}
 John said Mary have made me wash SE

¹⁹ Koster and Reuland (1991) refer to binding across a subject as *medium distance binding* (p. 8).

‘John said that Mary had made me wash him’

One interesting observation about (30), (31), and (32) is that long-distance anaphors (*ziji*, *seg*, *ser*) are mono-morphemic, in contrast to the bi-morphemic English reflexive *himself*.²⁰ This led to a bifurcation in binding theory into mono-morphemic reflexives, which allow long-distance anaphora, versus bi-morphemic reflexives, which do not. This bifurcation is often referred to as Pica’s Generalization (Pica 1985, 1987, 1991). Here are some examples of both kinds of anaphors:

Complex-local (SELF) anaphors		Simplex (SE) anaphors	
English	<i>himself</i>	Latin	<i>se</i>
Dutch	<i>zichself</i>	Dutch	<i>zich</i>
Norwegian	<i>seg selv</i>	Italian	<i>sé</i>
Italian	<i>se stesso</i>	Norwegian	<i>seg</i>
Finnish	<i>hän itse</i>	Finnish	<i>itse</i>

A cross-linguistic examination of anaphoric systems reveals that, within Germanic languages, English is *unusual* in making a simple distinction between complex (SELF) anaphors and pronominals. A tripartite system that distinguishes between pronouns, simplex anaphors, and complex anaphors is found in a typologically diverse range of languages, including Mandarin, Japanese, Fijian (Austronesian), Mohawk (Iroquoian), Sakha (Turkic), Georgian (Kartvelian), and Erzja (Uralic), among others. Each of these three kinds of anaphors (simplex anaphors, complex anaphors, and pronouns) is subject to different syntactic constraints. The simple division of anaphors into reflexives and pronouns presupposed in CBT proved to be inadequate. Any viable account of binding

²⁰ Note that in the Norwegian and Icelandic examples the clause-mate subject of the anaphor cannot be an antecedent. However, Mandarin allows the local subject to be an antecedent for the anaphor. Mandarin is unusual in this regard.

must incorporate the distinction between complex and simplex anaphors (Reinhart and Reuland 1991, 1993).²¹

In this regard, we would note that the discourse-functional theory proposed by APL suffers from the same fate as the original CBT, because it is limited to a simple distinction between pronouns and complex anaphors, such as the English reflexive pronoun, *himself*. Therefore, APL's binding theory is unable to account for the contrasting distributions of simplex and complex anaphors and, as such, the empirical base is much narrower than that of formal binding theory.

Interestingly, simplex anaphors sometimes allow local antecedents. This is illustrated in (33)a. The prohibition on locally bound simplex anaphors is associated with particular verbs (see for instance (33b)). In the examples in (33), the discourse roles of the complements to the verbs 'wash' vs. 'hate' are the same; they are both targets/recipients. Yet, the verb *wash* allows for a simplex anaphor, whereas the verb *hate* does not tolerate a simplex anaphor.

Dutch

(33)

- a. Jan_i wast zich_i/*hem_i (target)
John washes SE/him

- b. Jan_i haat zichzelf_i/*zich_i/*hem_i (target)
John hates SELF/SE/him

Accounts based on discourse-functional principles have been proposed to distinguish verbs that take a simplex versus a complex anaphor. Typically, these accounts mark a distinction between actions that are prototypically self-directed versus actions that are

²¹ We note that formal theories of binding differ in their analyses. For example, Rooryck and Vanden Wyngaerd (2011) argue that the distinction between SELF anaphors and SE anaphors does not have the explanatory significance that the distinction assumes in Reinhart and Reuland's approach. This comes at the cost of descriptive adequacy (Volkova and Reuland 2014).

other-directed (e.g. Levinson 2000).²² As Volkova and Reuland (2014) point out, however, there is no way to determine independently whether a verb is self-directed or other-directed. More generally, the fact that simplex anaphors share common attributes with both pronouns and complex anaphors (within a language) reveals the limitations of APL's discourse-functional account, which only predicts the existence of reflexives with a local antecedent. Once again, the coverage of the principles proposed by APL is not as extensive as that of the syntactic binding theory.

3.3 Exempt vs. non-exempt reflexive pronouns

Surprisingly, the complex reflexive *himself* can sometimes be anaphorically linked to an antecedent outside its local domain, including an antecedent that is not a target/recipient (Pollard & Sag 1992, Reinhart & Reuland 1993). Such facts are challenging for both CBT and for discourse-functional accounts. An example is (34)a, where the reflexive *himself* takes *Max* as an antecedent, even though the two expressions are not clause-mates. At the same time, it is impossible for *himself* to have *Max* as its antecedent in (34)b. Presumably the sentences in (34) do not differ in discourse properties. This makes it difficult, in principle, for discourse-functional accounts of binding to explain why (34a) is well-formed, but (34b) is not. The one difference between the sentences is whether *himself* is conjoined with *Lucie* or not. There are well-developed formal syntactic proposals (e.g., Pollard and Sag 1992, Reinhart and Reuland 1993) that account for the contrast witnessed in the examples in (34), but APL offer no explanation of the contrast.

(34)

- a. Max_i boasted that the queen invited Lucie and himself_i for a drink.
- b. *Max_i boasted that the queen invited himself_i for a drink.

²² An alternative functionalist proposal by Haspelmath (2008) contends that the choice between a simplex and a complex anaphor depends on the frequency of a particular verb's reflexive use. The principle "more frequent patterns are coded with less material" means that verbs that are frequently used coreferentially select simplex anaphors. This frequency account should apply to direct objects as much as to objects embedded in PPs. Dimitriadis (2013) shows, however, that the frequency account does not account for the distribution of anaphors in PPs.

3.4 Same discourse functions, different binding effects

There are sentences that have a similar discourse-functional structure but differ in the distributions of reflexives and pronouns. Consider the examples in **Error! Reference source not found.** In both examples the anaphor is the subject of the embedded clause, which is itself the complement to a psychological verb. These examples require different types of anaphors, because of their structural/syntactic properties. The verb *consider* in (35)a takes an infinitival complement, whereas the verb *think* in (35)b takes a tensed complement. It is not clear that these structural differences could affect the discourse-functional properties of the anaphors they contain. In the absence of an account of this difference, the principle proposed by APL fails to account for the contrast in **Error! Reference source not found.**

(35)

- a. John_i considers *him_i/himself_i to be a genius
- b. John_i thinks that he_i/*himself_i is a genius

A similar contrast arises in the examples in **Error! Reference source not found.** The discourse role of the reflexive pronoun *herself* in (36)a and (36)b is the same in both examples. The reflexive pronoun is the target of the verb *present*. Yet (36)a allows a reflexive pronoun, but (36)b does not:

(36)

- a. Mary_i said it was upsetting/amusing to present herself_i as a gravedigger
- b. *Mary_i said it was upsetting/amusing to Bill to present herself_i as a gravedigger

(Landau 2010: 369)

A discourse-functional approach could point to a difference in perspective to account for the contrast in **Error! Reference source not found.** That is, **Error! Reference source not found.**a expresses Mary's perspective on the situation, whereas **Error! Reference**

source not found.b expresses Bill's perspective. However, this does not explain why the same contrast does not arise in **Error! Reference source not found.**. The examples in **Error! Reference source not found.** display the same difference in perspective as in **Error! Reference source not found.**, but there is no similar contrast in the acceptability of a reflexive. This is another phenomenon that resists an explanation using discourse-functional principles.

(37)

- a. Mary_i seems to behave herself_i at parties
- b. Mary_i seems to Bill to behave herself_i at parties

4 Conclusion

In this paper, we have offered a sample of the kind of evidence that can be marshalled as a challenge to the kind of discourse/pragmatic account of binding that is advanced by APL. We have shown that, rather than explain “the entire pattern of data,” APL discuss only a limited sample of examples in making their case for a discourse-functional binding theory, as compared to one based on syntactic principles. The core cross-linguistic binding facts that APL have overlooked have been well-documented in the literature. These facts include structural conditions that restrict the distribution and interpretation of different kinds of noun phrases; they include observations about the long-distance binding of simplex anaphors, and intricate reconstruction effects. Any viable theory of binding phenomena must be assessed against the empirical base that includes these phenomena. Contrary to APL's claim that “... in most cases, the two accounts make the same predictions” (e79), we have seen that the competing theories make quite different predictions, even on basic, uncontroversial data. In the cases we have considered here, only syntactic principles of binding can successfully account for these data. We conclude, therefore, that APL are not warranted in their claim that discourse-functional principles

can replace structural conditions on binding without loss of empirical coverage.²³

APL are not alone in arguing against syntactic constraints specific to language and in favour of domain general cognitive constraints on language. We cannot assess these alternative proposals here, but we would challenge these accounts, too, to show that the domain-general constraints they invoke have the same empirical scope as a domain-specific syntactic theory of binding (e.g., Bybee and McClelland, 2005; Christiansen and Chater, 2015). Adjudicating between approaches must take into account the kinds of data and cross-linguistic generalizations that we have pointed out in this paper.²⁴ Once we have discovered and offered an account of these generalizations in the domain of binding, we can take the further step of trying to derive these generalizations from more general properties of the language faculty (see, e.g., Reuland 2001, 2011) or from more general cognitive/computational properties.

In this paper, we have responded to several of the claims made by APL, including the claim that syntactic principles are redundant, at best, as compared to their discourse-pragmatic principles of binding. We have challenged this claim by raising counter-examples from English, and from several in other languages. Not only do APL fail to demonstrate the inadequacy of a syntactic binding theory, the functional principles APL propose are incapable of replacing the syntactic principles of binding. The reasons for this are twofold. First, APL restrict their account to a limited set of example sentences in a single language. Second, APL invoke notions like ‘topic-hood’ or ‘direct recipients of actions’ which are only vague shadows of the precise syntactic conditions that have been developed by linguists working within the generative framework to explain both similarities and differences in binding phenomena across languages. APL therefore fall short of their stated goal of demonstrating the superiority of a discourse-functional

²³ We note that APL do not address any issues about how binding phenomena are acquired. There are many interesting facts about the acquisition of binding (the delay of principle B, for example) that we might expect such a theory to inform.

²⁴ Note that we are not averse to explaining linguistic phenomena in terms of domain-general mechanisms. For example, pragmatics plays an important role in many linguistic explanations. Our point is that the theories that depend solely on domain-general mechanisms do not capture the empirical scope of the existing data and we therefore accept the language-specific theories that do offer some explanation. This does not preclude domain general theories but such theories must meet minimal standards of empirical adequacy.

account of binding phenomena. But APL also have a broader agenda, which is to question the need for the kind of innate linguistic knowledge that syntactic principles posit: “[i]n short, ‘you can’t learn X without innate knowledge’ is no argument for innate knowledge, unless it is followed by ‘... but you can learn X with innate knowledge, and here’s one way a child could do so’” (APL, 2014, p. e82). This argument is a non-sequitur. An engineer’s proof that bridges of a certain design will collapse does not depend on providing an alternative design that will carry traffic. Fortunately, the syntactic theory of binding phenomena has constructed a bridge that carries traffic across the entire linguistic landscape, and children acquiring all human languages have access to the bridge, as part of Universal Grammar.

References

- Ambridge, B., Pine, J. M., & Lieven, E. V. (2014). Child language acquisition: Why universal grammar doesn't help. *Language*, 90(3), e53-e90.
- Ariel, M. (1990). *Accessing noun phrase antecedents*. London: Croom Helm.
- Bybee, J. and McClelland, J. L. (2005). Alternatives to the combinatorial paradigm of linguistic theory based on domain general principles of human cognition. *The Linguistic Review*, 22, 381-410.
- Chomsky, N. (1981). *Lectures on Government and Binding*. Dordrecht: Foris.
- Chomsky, N. (1986). *Knowledge of language: Its nature, origin, and use*. New York, Praeger
- Crain, S. and Thornton, R. (1998). *Investigations in Universal Grammar*. Cambridge, MA: MIT Press.
- Crain, S., Koring, L., and Thornton, R. (2016). *To appear* in Johan Bolhuis and Martin Everaert (eds), *Neuroscience and Biobehavioral Reviews*.
- Christiansen, M. H., and Chater, N. (2015). The language faculty that wasn't: a usage based account of natural language recursion. *Frontiers in Psychology*, 27 August, 2015.
- Dimitriadis, A. (2013). Formal and functional explanation in reflexive marking. Paper presented at *46th Annual meeting of the Societas Linguistica Europea (SLE)*, Workshop "Challenging reflexive strategies".
- Everaert, M. (1986). *The syntax of reflexivization*. Dordrecht: Foris.
- Fredin, R. (1986). Fundamental issues in the theory of binding. In Lust (ed.), *Studies in the Acquisition of Anaphora*, 151-188. Dordrecht: Riedel.
- Fox, D. (2000). *Economy and Semantic Interpretation*. Cambridge, MA. MIT Press
- Gelderen, E. van. (2000). *A history of English reflexive pronouns: person, self, and interpretability*. Amsterdam: Benjamins.
- Guasti, M. T. & Chierchia, G. (2000). Backward versus forward anaphora: Reconstruction in child grammar. *Language Acquisition* 8, 129-170.
- Haspelmath, M. (2008). A frequentist explanation of some universals of reflexive marking, *Linguistic Discovery*, 6(1), 40–63.

- Heinat, F. (2005). *Pronouns, probes, and Binding in the Minimalist Program*. Doctoral Dissertation, Lund University.
- Hicks, G. (2009). *The derivation of anaphoric relations*. Amsterdam: John Benjamins.
- Hoekstra, J. (1994). Pronouns and case: on the distribution of Frisian *harren* and *se* ‘them’. *Leuvense bijdragen* 83(1), 47–65.
- Huddleston, R. (1984). *Introduction to the grammar of English*. Cambridge University Press.
- Huddleston, R. & Pullum, G. K. (2005). *A student’s introduction to English grammar*. Cambridge University Press.
- Keenan, L. & Dryer, M. S. (2007). Passive in the World's Languages. In Shopen. Timothy (ed) *Clause Structure, Language Typology and Syntactic Description, Vol. 1*, 325-361. Second Edition. Cambridge: Cambridge University Press.
- Kiguchi, H. and Thornton, R. (2015). Connectivity effects in pseudoclefts in child language. *Studia Linguistica*, 70(1), 34-65.
- Koster, J., & Reuland, E. (1991). *Long distance anaphora*. Cambridge University Press.
- Kuno, S. (1987). *Functional syntax: Anaphora, discourse and empathy*. University of Chicago Press.
- Landau, I. (2010). The explicit syntax of implicit arguments. *Linguistic Inquiry*, 41(3), 357-388.
- Lebeaux, D. (1988). *Language acquisition and the form of the grammar*. Doctoral Dissertation, University of Massachusetts, Amherst.
- Lebeaux, D. (1990). Relative clauses, licensing, and the nature of the derivation. In Carter, J. et al (eds.), *Proceedings of NELS 20*, 318-332, GLSA, University of Massachusetts, Amherst.
- Lebeaux, D. (2009). *Where does binding theory apply?* Cambridge, MA: MIT Press
- Levinson, S. (2000). *Presumptive meanings: The theory of generalized conversational implicature*. Cambridge, MA: MIT Press.
- Lust, B. (2006). *Child language: Acquisition and growth*. New York: Cambridge University Press.
- Pica, P. (1984). Liage et contiguïté. In Milner, Jean-Claude (ed.), *Recherches sur*

- l'anaphore*, 119–164. Paris: CNRS.
- Pica, P. (1985). Subject, tense and truth. In Guéron, Jacqueline, Hans-Georg Obenauer & Jean-Yves Pollock (eds.), *Grammatical Representation*, 259–291. Dordrecht: Foris.
- Pica, P. (1987). *On the nature of the reflexivization cycle*. Paper presented at NELS 17, Amherst: GLSA, University of Massachusetts.
- Pica, P. (1987). On the interaction between antecedent-government and long-distance reflexivization. In Koster, Jan & Reuland, Eric (eds.), *Long-distance anaphora*, 119-135. Cambridge: Cambridge University Press.
- Reinhart, T. (1976). *The syntactic domain of anaphora*. Doctoral Dissertation, MIT.
- Pollard, C. and I. Sag. (1992). Anaphors in English and the scope of the binding theory. *Linguistic Inquiry* 23:261-305.
- Reinhart, T., & Reuland, E. (1991). Anaphors and logophors: an argument structure perspective. *Long distance anaphora*, 283.
- Reinhart, T., & Reuland, E. (1993). Reflexivity. *Linguistic Inquiry*, 24(4), 657-720.
- Reuland, E. (2001). Primitives of binding. *Linguistic Inquiry*, 32(3), 439-492.
- Reuland, E. (2011). *Anaphora and language design*. Cambridge, MA: MIT Press.
- Reuland, E., & M. Everaert. (2010). Reaction to: The Myth of Language Universals and cognitive science”—Evans and Levinson's cabinet of curiosities: Should we pay the fee?. *Lingua*, 120(12), 2713-2716.
- Reuland, E., & Reinhart, T. (1995). Pronouns, anaphors and case. *Studies in comparative Germanic syntax*, 241-268.
- Riemsdijk, H., & Williams, E. (1981). NP-Structure. *The Linguistic Review*, 1, 171-217
- Rooryck, J. & G. Vanden Wyngaerd. (2011). *Dissolving binding theory*. Oxford: Oxford University Press.
- Safir, K. (2004). *The syntax of anaphora*. Oxford: Oxford University Press.
- Sportiche, D. (2013). Binding Theory - Structure Sensitivity of Referential Dependencies. *Lingua*, 130, 187-208.
- Volkova, A., & Reuland, E. (2014). Reflexivity without reflexives?. *The Linguistic Review*, 31(3-4), 587-633.

Zribi-Hertz, A. (1989). A-type binding and narrative point of view: English reflexive pronouns in sentence and discourse. *Language*, 65(4), 695-727.