Principle C is just the beginning:

Investigating the influence of plausibility and pronominal position on coconstrual

Abstract

We present empirical evidence from a set of experiments targeting backwards anaphora constructions demonstrating that two factors interact with binding Principle C to influence coconstrual relations. First, we show that high plausibility of the coconstrual relation (which we operationalize by appealing to schemata) supports coconstrual. Second, we show that the structural position of the linearly-preceding, c-commanding pronoun matters: coconstrual is more likely with a pronoun in object position. Our findings further reveal variation among participant responses, suggesting that there are different strategies for resolving referential ambiguity, possibly from different grammars or constraint rankings. Our results thus more broadly highlight the need to look beyond mere structural constraints in the establishment of coconstrual relations, and raise fundamental questions about the representation of binding constraints in and among speakers.

keywords: Principle C, anaphora, backwards anaphora, binding, plausibility, processing, information structure

1. Introduction

Binding Principle C, as originally formulated in Chomsky (1981), is a syntactic restriction on possible *coconstrual* relations, which holds that an R-expression (e.g., a name) must be free (i.e., it cannot have a co-indexed c-commanding antecedent)[1]. As stated, Principle C accounts for a wide range of data, including the barred coconstrual in sentences such as those in (1) and (2), where coconstrual of the name and the preceding antecedent (whether it is a pronoun or another name) is deemed ungrammatical by Principle C.

(1) *He$_i$ said that John$_i$ would win. (Chomsky 1981: 193, ex. 25(i))

(2) *John$_i$ said that John$_i$ would win. (Chomsky 1981: 193, ex. 25(ii))

Over the years, however, a number of cases have been brought to light where Principle C fails to predict acceptability judgments, as in examples (3)-(14). Indeed, Sag acknowledges acceptability of coconstrual is such cases without qualification, and Grodzinsky & Reinhart (1993) even deem such exceptions 'perfectly grammatical' (pg. 78).[2]

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[1] We refer to it "Principle C" rather than "Condition C" following Chomsky's original terminology. Following Safir (2004, 2008), we use the term *coconstrual* to broadly indicate a full identity overlap relation between nominals resulting from either dependent identity relation or coreference.

[2] G&R indicate the coconstrual relation with italic font, but it may in fact be no coincidence that focus placement that favors coconstrual coincides with the italics.

(3) (Who is this man over there?) ***He***$_i$ is [***Colonel Weisskopf***]$_i$. (Grodzinsky & Reinhart 1993: 78 (19a))

(4) **He**$_i$ became known as **Napoleon**$_i$. (Levinson 2000: 302 (40j))

(5) Everyone has finally realized that Oscar is incompetent. Even ***he***$_i$ has finally realized that ***Oscar***$_i$ is incompetent. (Evans 1980: 357 (52), also cited in Grodzinsky & Reinhart 1993: 78 (19c))

(6) I know what Ann and Bill have in common. She thinks that Bill is terrific and ***he***$_i$ thinks that ***Bill***$_i$ is terrific. (adapted from Evans 1980: 356 (49), cited in Grodzinsky & Reinhart 1993: 79 (19d))

(7) **He**$_i$ put on **John**$_i$'s coat; but only John would do that; so **he**$_i$ is **John**$_i$. (Higginbotham 1985: 570 (63), adapted and further discussed in detail in Safir 2004: 28 (7)).

(8) Only ***Churchill***$_i$ remembers ***Churchill***$_i$ giving the speech about blood, sweat, toil, and tears. (Fodor 1975:134, cited in Grodzinsky & Reinhart 1993: 78 (19b))

(9) What did he do? – **He**$_i$ did what **John**$_i$ always does – he complained. (Bolinger 1979: 292 (30); cited in Sag 2000: (17a))

(10) **He**$_i$ just could not believe that [**Ralph Barton Evans**]$_i$ could be wrong. (Bolinger 1977: 40 (383))

(11) **He**$_i$ had been staring at the control panel for over an hour when **Jack**$_i$ received a message from his commander. (attributed to personal communication with G. Lakoff (1987) by Harris & Bates 2002: 239 (4))

(12) The teacher warned **him**$_i$ that in order to succeed[,] **Walter**$_i$ was going to have to

work a lot harder from now on. (McCray 1989: 331 (6b), cited in Sag 2000: (17c))

(13) It was rather indelicately pointed out to **him**$_{\mathbf{i}}$ that **Walter**$_{\mathbf{i}}$ would never become a successful accountant. (McCray 1989: 331 (7b), cited in Sag 2000: (17d))

(14) If you try to tell **him**$_{\mathbf{i}}$ that the reason why **John's**$_{\mathbf{i}}$ dog was taken away from him$_{[i]}$ was rabies, he'll get very upset. (Sag 2000: (17e))

Thus it appears that Principle C alone is insufficient for determining coconstrual relations, and an appeal to other factors beyond structural constraints is necessary.

Here, we present the results of a forced-choice experiment along with a follow-up experiment for generalizability and replicability in which we manipulated two factors – the structural position of the c-commanding pronoun and plausibility of coconstrual between a pronoun and a name it c-commands – to determine the influence of both factors on acceptability of coconstrual in sentences with Principle C violations. Our experimental results reveal that both factors (pronominal position and plausibility) exert an influence on coconstrual, and yield a systematic additive effect. We go beyond previous accounts that only appeal to Principle C, or others that appeal to pragmatic or contextual expectations, to argue that a convergence of specific factors, including our conceptual and semantic representations, information structure, and sentence processing strategies, interact with syntactic binding constraints to influence coconstrual.

2. Background

Let us begin by looking more closely at the examples introduced earlier. We make two observations. First, the *structural position of the c-commanding nominal* – and in

particular, here we will concentrate on those examples where the antecedent is a pronoun – varies between the subject and object position. This variation is permitted, since Principle C does not differentiate based on the structural position of the antecedent. It uniformly rules out cases where the offending pronoun c-commands the name from the subject position, or from a lower structural node[3]. However, the data suggest that the choice of pronominal syntactic position matters, and that it interacts with *prosody* and focus structure.[4]

When the pronoun is in the subject position (e.g., in (9)-(10)), coconstrual appears to be made possible with focus prosody. Note, for example, that a simple H* pitch accent placement on the pronoun and/or name does not ameliorate such examples. Either the pronoun is focused, or another element in the sentence hosts the focus also or instead (e.g., *always* in (9) or *believe* in (10)). By contrast, when the pronoun is in object position, coconstrual is facilitated when the pronoun is de-stressed (or at least lacks a pitch accent). If the c-commanding pronoun in (12)-(14) were given an H*, coconstrual would most likely not be an option.

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[3] Pointing out multiple exceptions to Chomsky's Principle C, Bruening (2014) argues against Principle C being defined on the basis of c-command and instead proposes a definition based on the precede-and-command relation (a type of command that makes reference to both linear precedence and containment within a phase). The data discussed in this paper is problematic for both definitions of Principle C, so we proceed with Chomsky's original terminology for simplicity sake.

[4] See also, McCray (1980) for related observations.

Empirical support for the role of structural position and prosody in establishing or barring coconstrual relations comes from experimental work by Gor and Syrett on comparative constructions (Gor 2017; Syrett and Gor *in press*). The authors presented sentences such as (15) (with the pronoun in subject position) and (16)-(17) (with the pronoun in (in)direct object position) to participants in both forced choice and truth value judgment tasks, accompanied by visual images to support the candidate interpretations. Both the position of the pronominal antecedent and presence/absence of contrastive focus on the pronoun were manipulated. Both tasks indirectly asked participants to evaluate whether the items in bold could be coconstrued, or whether the pronoun had to refer to a sentence-external antecedent: in the forced choice task, participants were asked to choose an antecedent for a pronoun, and in the Truth Value Judgment Task (TVJT), to render an assessment of the truth of a target sentence, given visually-depicted quantity information.

(15) **She**$_i$ is eating bigger breakfasts than **Jane**$_i$ did last year.

(16) The travel agent offered **her**$_i$ a better deal than he offered **Mary**$_i$ last year.

(17) More cast members introduced **her**$_i$ to the male lead than to **Mary**$_i$'s understudy.

In the TVJT, acceptance rates of interpretations based on coconstrual between a pronoun and a name in its c-commanding domain revealed that coconstrual surfaced more often (a) when the pronoun was not in subject position, and (b) when the pronoun was de-stressed. Specifically, acceptance rates of object comparatives with a subject pronoun such as (15) were close to 0%, regardless of pronominal stress, while object comparatives with a non-subject pronoun such as (16) elicited 10% acceptance with an *accented* pronoun, and over 40% with a *de-accented* pronoun. Subject comparatives with

a de-accented non-subject pronoun such as (17)) elicited between 40-58% acceptance – rates well above those that would be predicted by Principle C, and consistent with rates of acceptance for control sentences where Principle C was moot.[5] Thus, the findings from Gor and Syrett accomplished two goals: they demonstrated a previously unreported subject-object asymmetry in licensing unexpected coconstrual relations and confirmed the role of prosody in resolving referential ambiguity.

However, as Bresnan (1973) astutely observed, the comparative clause construction in English "is almost notorious for its syntactic complexity." So one might argue that the target sentences in these tasks may have presented additional characteristics leading to a greater acceptability of coconstruals in instances not licensed by Principle C than in less complex cases. There is therefore an open question as to whether the same pattern will also hold in a different (less complex) syntactic environment.

The second aspect to observe about the examples in (3)-(14) is that such counterexamples are typically constructed in such a way as to encourage (or at least leave the door open for) coconstrual between the pronoun and the name based on the *plausibility of coconstrual* in the given context, as defined by the real world knowledge. For example, in (12)-(13) above, it is possible that the salient male referent for the pronoun is a paternal caregiver for Walter, but it is just as likely (if not more) that the referent is poor Walter himself. It is perhaps for this reason that researchers in recent

[5] Subject comparatives with a stressed pronoun were not tested given baseline data showing that a stressed pronoun heavily induced disjoint reference.

years have turned to pragmatics to explain those instances where coconstrual is uncontroversially licensed in the face of a Principle C violation.

Indeed, plausibility is known to have significant effects on both comprehension and interpretation during sentence processing. A sizable amount of experimental research has shown that manipulating plausibility influences parsing and has an effect on resolving ambiguities (Boland et al. 1990, 1995; Clifton 1993; Clifton et al. 2003; Ferreira & Clifton 1986; Garnsey et al. 1997; Kizach et al. 2013; Ni 1996; Pickering & Traxler 1998; Rayner et al. 1983; Tanenhaus et al. 1989; Traxler and Pickering 1996; Trueswell et al. 1994). For example, participants display a delay in reading times in the region after the verb *shot* for an implausible lexical item (*garage*) relative to a plausible one (*pistol*), given a shooting event.

(18) That's the {garage/pistol} {in/with} which the heartless killer shot the hapless man yesterday afternoon. (Traxler and Pickering 1996: 458-459 (8a-d))

Likewise, the presence of a verb can set up expectations based on selectional restrictions about information such as thematic roles of arguments and types of complements (Rayner et al, 1983; Taraban and McClelland 1988).

One way of conceiving of plausibility is to think of it in terms of *conceptual or semantic coherence*. That is, certain relations between event participants and thematic roles are more or less likely, given prior experience with past events and real world knowledge (Collins & Michalski 1989; Connell & Keane 2004; Johnson-Laird 1983). When experimental participants make judgments or render behavioral responses, they call upon this knowledge and their memory of prior events and relations to make

inferences about the linguistic stimulus with which they are presented, and at some level, assess whether the relations in their parse are a good match relative to this experience and knowledge (Connell & Keane 2004). Applying this to (18), it's much more plausible to shoot someone with a pistol than with a garage.[6]

In order for this information to be efficiently and effectively recruited in online processing, it needs to be represented with a structure. One way of operationalizing this structure is in terms of a *schema*, a term first introduced by Bartlett (1932) and Piaget (1926). Roughly, schemata are higher-level generic knowledge structures that organize lower-level representations from long-term memory and influence the comprehender's interpretations, inferences, expectations, and attention. They are generic in that they encode an abstracted summary of the components, attributes and relations that are typically instantiated in specific exemplars of real life scenarios (Ghosh & Gilboa 2014; Gilboa & Marlatte 2017; Graesser & Nakamura 1982). Thus, our experience with individuals, objects, and events in the world leads us to encode certain relations and concepts, which then become structured representations (*schemata*), which in turn guide our expectations and inferences about linguistic information in terms of plausibility.

Previous research, including some of the papers cited above, has provided

[6] We therefore see our conceptualization of plausibility as being consistent with *coherence*-driven analyses of coreference (e.g., Kehler *et al*. 2007), and see our research program as having a similar goal: to determine the role of context, world knowledge, and processing strategies, and attempt to predict how pronouns will be interpreted in a given utterance.

evidence for the role of plausibility in establishing dependency relations (e.g., between a moved element and a gap, as in Kizach et al. (2013)). Here, we investigate the role of plausibility in another type of dependency: the coconstrual relation between a pronoun and a name in structurally illicit backwards anaphora. The basic hypothesis we entertain is this: the schemata we encode in our memory about event participants and relations set up expectations about coconstrual. Apart from syntactic binding constraints, the processor is also guided by this knowledge, leading the comprehender to draw a comparison between referent/role assignments within a given scenario (or target sentence) and those represented in memory. As a result, coconstrual may be *ruled out* when it is judged implausible, even if Principle C is silent and coconstrual is not syntactically constrained, or it may be *allowed*, even when ruled out by Principle C, if such coconstrual relation is deemed plausible.

Taking stock, we are faced with the following picture. A handful of examples culled from the literature over the years, along with experimental work on structurally illicit coconstrual relations in comparative constructions, offer strongly suggestive evidence that both structural position of the c-commanding pronoun and plausibility of the coconstrual relation play a role in establishing coconstruals otherwise barred by Principle C. This pattern would appear to suggest in turn that Principle C is not sufficient for predicting when coconstrual is allowed.

This observation alone is not a new one. Previous theoretical proposals have also pointed out insufficiency of Principle C in determining coconstrual relations and attempted to account for apparent counterexamples by appealing to factors outside syntax

(e.g., Chien & Wexler 1990; Evans 1980; Grodzinsky & Reinhart 1993; Johnson 2013; Harris and Bates 2002; Heim 1982; Levinson 2000; Reinhart 1983; Safir 2014; Schlenker 2005). We do not take issue with the substance of these proposals here, but note that these accounts only explain a portion of the problematic dataset, and none of them puts forward a proposal detailed enough to allow us to *systematically predict* when such structurally problematic coconstruals may be licensed. To illustrate these points, we review the main claims we distill from these proposals here.

Heim (1982) offered an account of problematic data based on the concept of *guises*, proposing that the same individual may be represented by more than one index if the *pragmatics of the situation* is such that it supplies distinct perspectives on this individual. Formulated as such, Heim's proposal may account for identity sentences such as (3) and (4), 'instantiation context'[7] examples such as (5) and (6), and perhaps examples such as (7)-(10). Still this proposal is not straightforwardly applicable to the data remaining on the list or the comparatives data. What's more, a precise formulation of what gives rise to the "pragmatics of the situation" such that it supports multiple guises, though intuitively clear, is not stated explicitly.

Reinhart (1983) argued that the constraint on intrasentential coreference cannot be syntactic and is the result of a Gricean generalized conversational implicature. As such, it must be based on an inference derived from sources such as knowledge of the grammar, meaning, and appropriateness to context. Still this proposal provided no details regarding

[7] Instantiation context is a term introduced in Safir (2004) to refer to cases where individuals are singled out as instantiations of properties under discussion.

which *specific* aspects of meaning or properties of context play a role in acceptability of problematic coconstruals.

Chien & Wexler (1990), also arguing for the division of labor between syntax and semantics/pragmatics, proposed that the relation between indices is regulated by syntax, but the interpretation of those indices is governed by pragmatic and semantic principles. They further offered an account of the problematic data by introducing a pragmatic Principle P, requiring that contraindexed NPs be non-coreferential. However, exceptions may be observed in cases where the *context* explicitly forces coreference. But this aspect of the proposal is admittedly vague. In a somewhat similar vein, Safir (2004) reformulated Principle C as pragmatic obviation, stating that when the name is c-commanded by a pronoun, an expectation of non-coconstrual is created. According to Safir (2004), this expectation can be further adjusted by a particular type of *pragmatic context*. Formulated so broadly, these proposals also fall short of specifying the exact properties that a context should (or even more weakly, might) possess in order to allow coconstrual in the face of a Principle C violation. As a result, it is not possible to define the range of data that these proposals could account for, or to appeal to them to make specific predictions about acceptability judgments of sentences of a given form in a given context.

Harris and Bates (2002) argued that manipulating information structure ("backgrounding" the matrix clause with the subject pronoun via the use of progressive or pluperfect aspect) allows this pronoun to refer to the same individual as the name in its c-commanding domain contained in the adverbial adjunct clause, as in (11) and (19).

(19) **He**$_i$ <u>was threatening</u> to leave when **Billy**$_i$ noticed that the computer had died (Harris & Bates 2002: 244, Table 1).

Unlike other proposals, Harris and Bates (2002) do in fact identify a set of specific factors allowing for coconstrual between the pronoun and the name in its c-commanding domain. However, they require all of those multiple factors to be observed within one sentence for coconstrual to accessible, and as a result they offer an account of an extremely restricted number of cases: specifically, those where the matrix clause has a verb in progressive or pluperfect aspect and there is a pronominal subject c-commanding the name in the subject position of an adverbial temporal adjunct clause introduced by subordinator *when* or *after,* and the thematic role of the embedded subject is either a patient or experiencer, as in (11) and (19).[8] As Harris and Bates (2002) themselves notice, deviating from either one of those conditions alters judgments of acceptability.

Given this state of affairs, our knowledge of the conditions under which

[8] Kazanina (2005) argues that such cases should not be treated as counterexamples to Principle C at all, since the pronoun does not c-command the R-expression. She instead proposes that in such sentences, the temporal clause is merged above the matrix subject, and thus there is no structurally problematic relation between the pronoun and the name. If indeed this is the case, then we lose a proposal to account for some of the counterexamples to Principle C, but then another question arises: why would coconstrual in such examples be questionable in the first place if Principle C is silent? We leave this issue aside here, since our target sentences do not split the pronoun and name across main and adjunct clauses, as they are in the Harris & Bates (2002) examples.

coconstrual might be permitted in the face of a Principle C violation remains uncertain. In order to present a fully generative and predictive theory of coconstrual, it is incumbent upon us to gather empirical evidence about which specific factors play a role in allowing a coconstrued interpretation to become accessible, and explain why they perform the role that they do. That is the aim of this paper.

3. Experiment 1

3.1. Participants

56 university undergraduate students enrolled in an introductory Linguistics or Cognitive Science course, all native speakers of English (as determined by a demographic questionnaire), participated for course credit. The experiment has two parts, involving separate pools of participants: a norming study (n= 25) and a binary forced-choice study (n=31).

3.2. Norming Study: Controlling for plausibility of coconstrual

We began by conducting a norming study to obtain quantitative baseline data on judgments of plausibility relative to coconstrual in the absence of any Principle C violation, so that the stimuli could be further transformed into the targets for the actual experiment.

3.2.1. Materials

Test items were constructed as triplets of sentences, with each triplet based on the same main verb, which was either a double object (DO) or an exceptional case marking (ECM) predicate. This choice was motivated by the fact that both types of predicates/constructions accommodate two distinct argument DP positions – a subject

and an object, which c-command a third DP (Marantz 1993; Pylkkänen 2000; Postal 1974; Lasnik 1999), allowing us to manipulate the position of the antecedent, while holding the c-command relation and construction constant. To illustrate that the c-command relation holds as indicated, examples (20)-(23) indicate quantifier binding (which relies on c-command (Reinhart 1983)) from subject and object positions in both DO and ECM constructions. Tree structures for the cases of c-command from the object position, i.e., (22)-(23), are presented in Fig. 1. (We highlight object position here, since we take c-command from subject position to be uncontroversial.)

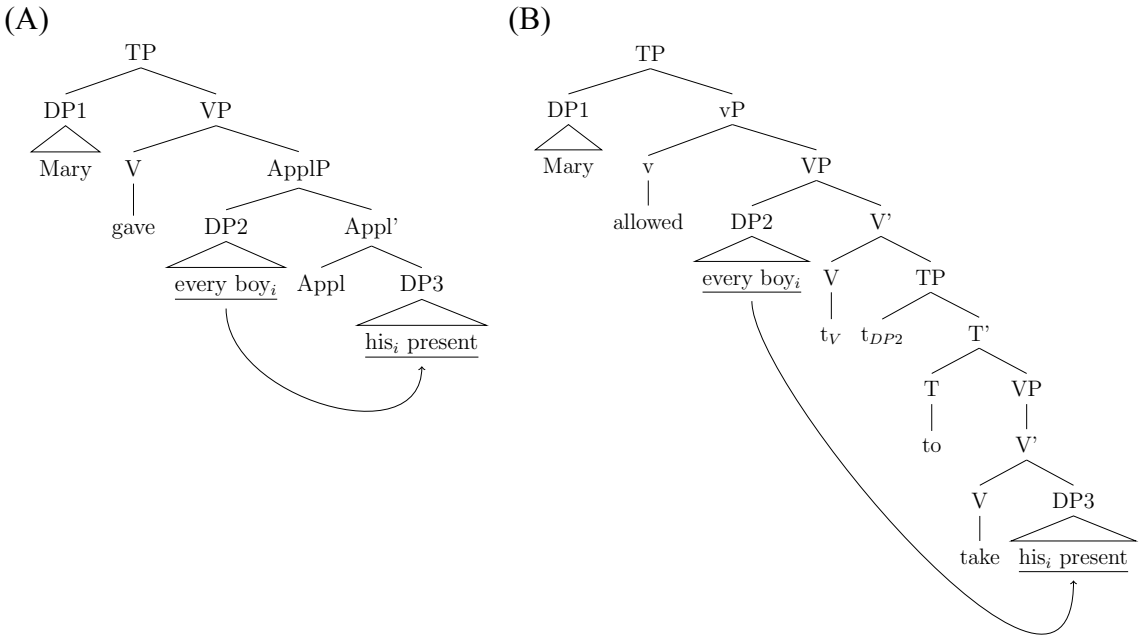
(20) [Every girl]$_i$ gave James her$_i$ manuscript. (DO, binding by subject)

(21) [Every girl]$_i$ allowed James to read her$_i$ manuscript. (ECM, binding by subject)

(22) Mary gave [every boy]$_i$ his$_i$ present. (DO, binding by object)

(23) Mary allowed [every boy]$_i$ to take his$_i$ present. (ECM, binding by object)

Figure 1. Tree structures showing c-command relations between object DPs for sample sentences with DO (A) and ECM (B) predicates in (22) and (23).



We then created stimuli in which each target sentence featured a name c-commanding a same-gender pronoun that had the potential to be coconstrued with the name (since Principle C imposes no restriction in such cases). Thus, all target sentences in the norming task involved forward anaphora with a female name (e.g., *Emily*) c-commanding a possessive phrase with a gender-matching possessive pronoun (e.g., *her book*). The name c-commanded the possessive phrase either from a subject or from an object position. (These sentences were later transformed to yield a Principle C violation for the actual experiment.) We further manipulated the sentences to reflect a possible range of plausibility of coconstrual relations in order to obtain empirical data based on which we could categorize sentences into high or low plausibility of coconstrual. The norming task was therefore a reduced version of a 2x2 design with *structural position of*

the c-commanding nominal (subject vs. non-subject) and *plausibility of coconstrual* (high vs. low) as within-subject factors.[9] Two sets of sample test items are presented in Table 1.

[9] The fourth possible condition of the 2x2 design (*subject DP* x *low plausibility of coconstrual with sentence-internal referent*) was not included for the following reason. Since DO predicates often denote physical transfer (e.g., *give, send, sell, lend, hand*) or mental transfer (e.g., *tell, explain, show*) (Krifka 2004), the sentence-internal referent denoted by the subject DP/agent is a more plausible possessor of the direct object (theme) than a sentence-external referent (in the absence of a preceding discourse favoring one or the other). This observation is illustrated in (i), where Emily is a more plausible possessor of the painting than a female not mentioned in the sentence. While there exists a small number of DO predicates that do not follow this pattern (see e.g., the questionable sentence with *buy* in (ii)), the number is too limited to yield a lexically diverse set of test items.

i. Emily$_i$ gave John her$_i$ painting.

ii. Emily$_i$ bought John her$_j$ painting.

Table 1. Two sample sets of test items appearing in the norming study, with position of antecedent and predicted level of plausibility of coconstrual between items in bold

	Example sentences	Antecedent Position	Coconstrual Plausibility
DO Construction, verb=*give*			
(24)	**Emily**$_i$ gave Tommy **her**$_{i/j}$ phone number.	subject	high
(25)	Mr. Barker gave **Emily**$_i$ **her**$_{i/j}$ report card.	object	high
(26)	Richard gave **Emily**$_i$ **her**$_{i/j}$ contact information.	object	low
ECM Construction, verb=*believe*			
(27)	**Pamela**$_i$ believed the doctors to have **her**$_{i/j}$ scan results.	subject	high
(28)	The classmates believed **Pamela**$_i$ to have finished writing **her**$_{i/j}$ essay.	object	high
(29)	The gallery owners believed **Pamela**$_i$ to admire **her**$_{i/j}$ painting.	object	low

3.2.2. Procedure

Participants were asked to read each sentence and judge on a Likert scale (with values ranging from 1 to 5) whether the possessive pronoun *her* referred the sentence-internal antecedent (e.g., *Emily*) (1: "it is definitely the case that *her* means *Emily*'s") or to another female (5: "it is definitely the case that *her* means *another girl's*, and not *Emily's*"). See Appendix B for the entire scale and the full set of instructions to participants from all studies reported in this paper.

3.2.3. Results

We targeted the edges of the distributions of ratings to create triplets of sentences. We began by selecting items where each member of the set received an average rating across participants that was on one side of the respective scale (reflecting high or low plausibility of coconstrual). We then averaged within each category of sentence type, as shown in Table 2, and selected those sentences that fell within 1 standard deviation of the

group mean. This filtering processes yielded 11 out of 15 triplets. The four remaining triples included sentences whose ratings fell outside the cut-off range (i.e., were too close to the middle of the scale to be classified as either "high" or "low" plausibility of coconstrual). The sentences in the 11 remaining triplets were then transformed into stimuli for the experiment by switching the order of the name and pronoun, thereby creating a Principle C violation. See Appendix A for a full set of stimuli appearing in the norming study and the experiments.

Table 2. Average ranking received by each type of target items in the norming study given the experimental factors and cut-off range for the selected stimuli.

Type of Target Item	Average Ranking	Cut-off Range
Subject Antecedent / High plausibility	1.49	$0 < n < 1.73$
Object Antecedent / High plausibility	1.72	$0 < n < 1.97$
Object Antecedent / Low plausibility	3.67	$3.21 > n > 5$

3.3. Forced Choice Task

3.3.1. Materials

As indicated in the previous section, target stimuli for the forced choice study were generated from 11 triplets of test items from the norming study, for a total of 33 target sentences, all of which had a pronoun in non-subject position c-commanding the name DP. Table 3 presents the target stimuli in (30)-(31) for the *give* DO predicate/construction, which were transformed from the norming stimuli in (24)-(26) presented in Table 1.

Table 3. Sample forced choice test items for DO predicate *give*

Example target sentences		Pronoun Position	Coconstrual Plausibility
(30)	**She**$_{i/j}$ gave Tommy **Emily**$_{i}$'s phone number.	subj	high
(31)	Mr. Barker gave **her**$_{i/j}$ **Emily**$_{i}$'s report card.	obj	high
(32)	Richard gave **her**$_{i/j}$ **Emily**$_{i}$'s contact information.	obj	low

The forced choice task thus had a reduced 2x2 design with *pronominal position* (subject vs. non-subject) and *plausibility of coconstrual* (high vs. low) as factors, which were manipulated *within* subjects. There were two types of controls featuring forward anaphora, which were also predicted to vary in their level of plausibility of coconstrual (high, as in (33), vs. low, as in (34)), in order to obtain a baseline for the influence of this factor outside cases restricted by Principle C.

(33) Emily's car let her down again last week.

(34) Emily's story brought her to tears.

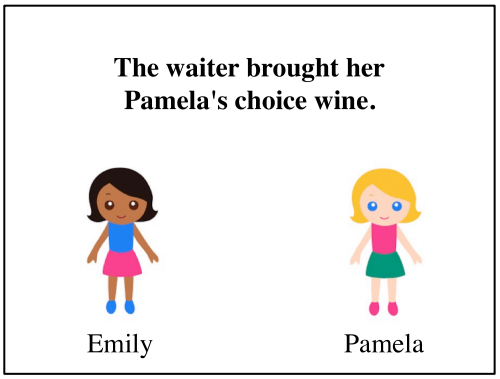
Each participant saw all 33 target sentences, all 14 control sentences, and 13 filler items for a total of 60 items. (There was no confound in participants viewing all three members of the triplet, since the triplets members only share the predicate/construction and name, and no other semantic content.)

3.3.2. Procedure

The study was conducted in a laboratory setting, where participants were run one or two at a time in a quiet room at individual response stations. Items were presented on an iMac using SuperLab stimulus presentation software (v. 5). The experimental session began with a brief training session with non-target items, to acclimate participants to the task. Each trial had the same structure (see Fig. 2). Participants viewed a screen presenting

images of two female characters side by side labeled as *Emily* and *Pamela*, which were both introduced with equal prominence during a training session. The target or control sentence appeared above the images. Participants were asked to read each sentence to themselves, and choose between a sentence-internal or sentence-external same-gender referent for the pronoun by pressing a key marked with a respective name on the response pad. (See Appendix C for the full set of instructions). The use of one or the other female name in the sentence was counterbalanced across all items, but the position of the female referents remained constant on the screen. Target and control items were randomized within the session. Each session lasted approximately 10-15 minutes.

Figure 2. Sample stimulus for the forced choice task.



3.3.3. Results

The results for control and target items are summarized in Fig. 3 below. We begin with the findings for the control items. With controls, which involved forward anaphora and hence did not present a violation of Principle C, we predicted that the choice of pronominal antecedent might be guided by plausibility of coconstrual. The results confirm this prediction.

Control items

Controls with predicted high plausibility of coconstrual yielded near-ceiling choice of sentence-internal referent (98.6%), while those with low plausibility (determined as part of the ranking study) yielded only 21.2 % (indicating that almost 80% of the time, participants chose a sentence-external referent, even without Principle C forcing them to do so). Thus with the control sentences, we offer a proof of concept for the robust role of plausibility in establishing coconstrual relations in environments without any Principle C violation, when the choice of referent is up for grabs.

Target items

We now move on to the target items. Here, too, our predictions were borne out. Target items with low plausibility of coconstrual yielded a correspondingly low percentage of sentence-internal referent chosen. Participants chose the intra-sentential referent for cases where the pronoun c-commands the name from the object position only 2.9% of the time. (Recall that low-plausibility was not tested with pronominal subjects for reasons outlined above.) This result is perhaps not so surprising, if Principle C is invoked and categorically rules out coconstrual. However, the true test of our hypotheses comes with the high plausibility items with the pronoun in subject and object position, and here we find a significant influence of both factors (*plausibility* and *pronominal position*).

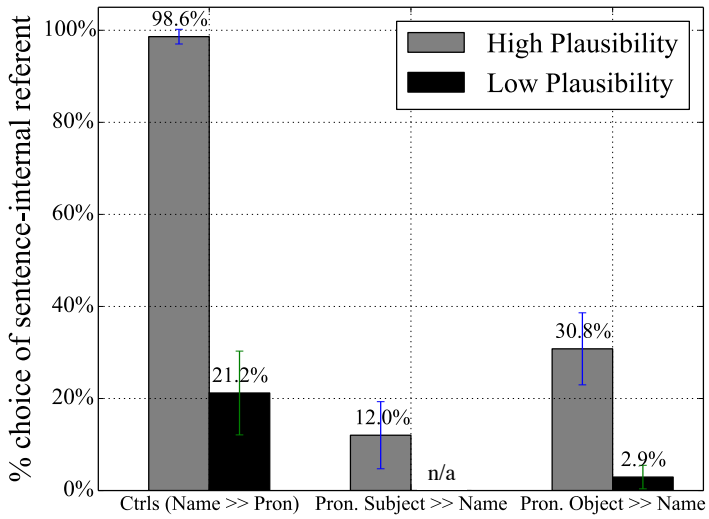
Those items with highly-rated coconstrual yielded percentages of intra-sentential referent selection that were not only higher than with low-rated items, but were also higher than what would be predicted by structural constraints. This effect was especially

pronounced in cases where the pronoun c-commanded the name from the object position: while we observed only 12% choice of intra-sentential referent for cases where the pronoun c-commanded the name from the subject position, this referent was selected 30.8% of the time when the pronoun was in object position. To underscore this point, *near one third of the time*, participants allow coconstrual in cases *where Principle C unequivocally rules it out*. A binomial logistic regression model and pairwise comparisons revealed significant effects of pronominal position ($\beta = -1.5654$; SE = 0.2901; $p < 0.001$), plausibility ($\beta = 3.2866$; SE = 0.4125; $p < 0.001$), and Principle C status ($\beta = -2.4622$; SE = 0.4452, $p < 0.001$)[10]. There was no significant effect of predicate/construction type (DO vs. ECM) ($\beta = 0.3260$; SE = 0.4922; $p = 0.508$), indicating that the type of predicate or construction did not play a role; what mattered

[10] Since this study was created as a reduced version of the 2x2 design, the binomial logistic regression model was not able to reveal the significance of interaction between the two experimental factors (*pronominal position* vs. *plausibility*). Nevertheless, given the significant contrast between the averages, it is possible to draw a conclusion that there is an interaction between the two, where the combination of two factors favoring coconstrual (pronominal object position and high plausibility of coconstrual) gives rise to an additive effect. The average percentage observed in this condition (over 30%) exceeds the closest ranking category by 2.4 standard deviations, or by the factor of 2.6). This conclusion about the combined force of the two factors appears to be further confirmed in the distribution of individual participant responses across the target item types, as shown in Fig. 5 and the discussion that follows.

was the other factors that we manipulated.

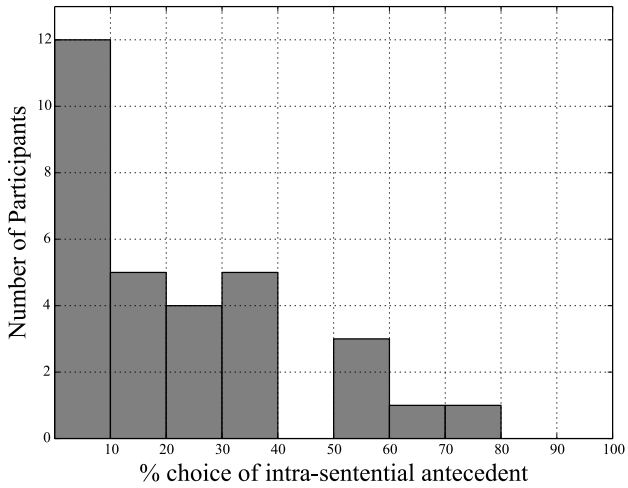
Figure 3. Percentage choice of intra-sentential referent for the pronoun across items and conditions.



Distribution of participants

Given the striking results of acceptability in the face of a Principle C violation, we analyzed the pattern of results from individual participants (following a strategy by Syrett (2015)). Fig. 4 presents a histogram of the distribution of individual participants' selection of an intra-sentential antecedent for a pronoun in target sentences with high plausibility of coconstrual. (For this and other histograms, the maximum value on the y axis is set to slightly exceed the maximum value for the largest bin of participants, and therefore varies between Figures 4 and 5.)

Figure 4. Distribution of participants' selection of intra-sentential referent in target sentences with a Principle C violation but high plausibility of coconstrual.



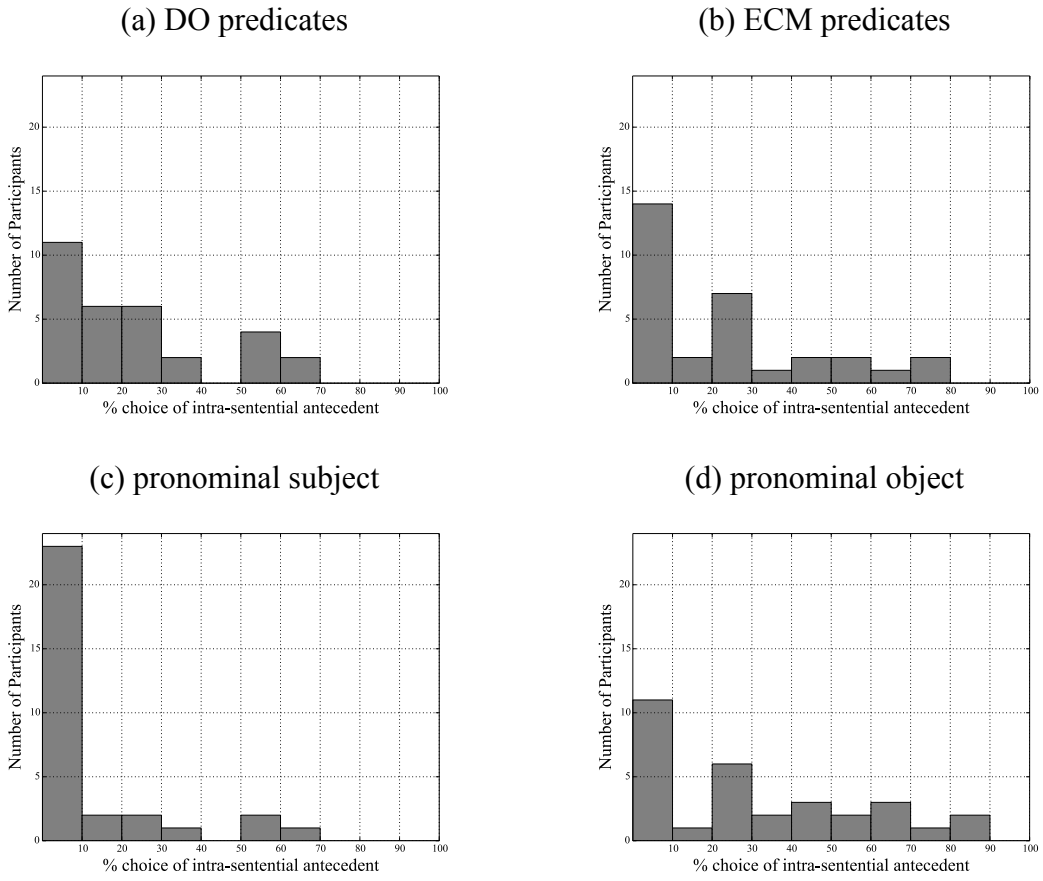
As Fig. 4 shows, participants' responses to target items were not uniform, and there was a positive skew. While approximately half (17 of 31) of the participants (54.8%) selected a structurally illicit antecedent less than 20% of the time, as Principle C (plus allowable noise) would have it, nine (29%) selected it 20-40% of the time, and five (16.2%) selected it 50-80% of the time. Recall that responses to control and filler sentences, as well as to questions the in-lab demographic questionnaire, provide us with no reason whatsoever to doubt either the native-speaker status or judgments of these participants or their attention during the task.

Distribution of responses across target sentence types

To further investigate the influences on allowable coconstrual in the face of a Principle C violation, we evaluated the distribution of the selection of an intra-sentential referent across target sentence types, controlling for plausibility and focusing on just

those cases with high plausibility where coconstrual was allowed. These analyses appear in Fig. 5.

Figure 5. Distribution of selection of intra-sentential referent across target sentence types with high plausibility (all subject to a Principle C violation)



As Fig. 5 shows, responses to sentences with DO or ECM predicates resulted in a highly similar skewed distribution of intra-sentential referent selection: under 20% of the time (DO: 17 participants (54.8%), ECM: 16 (51.6%)); between 20-50% of the time (DO: 8 participants (25.8%), ECM: 10 (32.3%); between 50-80% (DO: 6 participants (19.4%), ECM: 5 (16.1%). These distributions are consistent with the statistical analysis, which revealed no significant effect of predicate type.

On the other hand, the distributions of the pronominal subject and object sentences, while also positively skewed, diverge, and are therefore consistent with the statistical analysis, which revealed a significant effect of structural position of the c-commanding pronoun, a finding fully consistent with independent research by Gor & Syrett (2018) and Gor & Syrett (to appear) on coconstrual in backwards anaphora embedded in not-at-issue content. Responses to the target sentences with a pronominal subject were remarkably uniform (Fig. 5c): an overwhelming 26 of the 31 participants (80.6%) selected a structurally illicit referent less than 20% of the time, while three (9.7%) selected it 20-50% of the time, and three (9.7%) selected it 50-70% of the time (and none more often than that). This pattern is entirely consistent with structural constraints on coconstrual driving responses. By contrast, responses to target sentences with a pronominal object were more disperse (Fig. 5d). Less than half (12) of the 31 participants (38.7%) selected a sentence-internal referent less than 20% of the time, and 19 of the 31 selected it between 20-90% of the time: 11 of these (35.5%) 20-50%, and eight of these (25.8%) 50-90% of the time. This difference across participants not only highlights the subject/object asymmetry, but also suggests that non-structural factors are not uniformly influential for all speakers. We return to this point in the discussion.

Generalizability and Replicability

One might be concerned that the influence of these factors only surfaces in a particular experimental paradigm. In order to generalize our findings across tasks, and to demonstrate replicability across different populations, we presented the exact same target sentences to participants in a follow-up judgment task run both in-lab and online (via

Amazon Mechanical Turk). This follow-up study is reported in Experiment 2.

4. Experiment 2

4.1. Participants

There were 97 participants (56 university undergraduate students, recruited and compensated as in Experiment 1, and 41 participants recruited online via Amazon Mechanical Turk). An additional 70 participants were excluded (non-native speaker status: n=15; failure to complete the task: n=15; failure on baseline grammatical controls (e.g., agreement errors or Principle B): 40). Native speaker status was determined by a demographic questionnaire in the lab, and via demographic questions and control questions included in the experiment in the MTurk version, along with a US IP address. All participants accessed the study via an online link.

4.2. Materials and Procedure

The judgment task was designed and administered via Qualtrics software. The same sentences from Experiment 1 were used in Experiment 2, presented in pseudorandomized order. This time, instead of being asking to choose between two salient female referents in a binary forced-choice task, participants were asked in response to the sentence prompt, *Can [she/her] and Emily refer to the same person?* The inherent challenge of such a question is that it seems to lead to the calculation of the Gricean (manner) implicature that by default, *she* most likely does not refer to the name in the question, and the speaker is ascertaining the possibility that it could in some circumstance(s).[11] Thus,

[11] As a point of comparison, consider the same question with *Mary likes herself*, where the reflexive must be coconstrued with Mary. It seems odd to ask if *herself* can refer to

we anticipated obtaining depressed percentages of coconstrual, but predicted that if the factors we are interested in are robust enough, the same trends would hold – not only in comparison to the previous forced choice study, but also across two different populations of speakers. (See Sprouse & Almeida (2012), Sprouse, Schütze, & Almeida (2013), and Kotek & Erlewine (2016) for related discussion about online data collection.)

4.3. Results and Discussion

Both versions of the judgment study revealed the same cline previously observed for the three groups of target items in the forced choice study, regardless of the participant population, as shown in Table 4. The sentences with the pronoun in subject position where plausibility was low received minimal percentage of coconstrual, while those with the pronoun in object position revealed higher percentages, and those where coconstrual plausibility was high exhibited the highest percentages by far. Thus, the two factors we have identified exert a significant influence on the availability of coconstrual relations in the face of Principle C violations regardless of the experimental task we employ, although a task (or question prompt) that is more neutral in its assumptions about whether or not coconstrual is possible opens the door for even higher percentages. Notice that in all cases, Principle C (however it is conceptualized) is never inactive; rather, its effect can be mediated by other factors. Again, we emphasize that this interaction is unexpected if we treat Principle C as an inviolable, hard and fast categorical principle of the grammar

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Mary, since it *must*. We suspect that participants interpreted the question in the judgment task as implying that the coconstrual relation probably does not hold, but asking if it was in principle possible.

that unequivocally rules coconstrual out or in on its own.

Table 4. Comparison of experimental results between Experiments 1 and 2 and the two experimental populations of Experiment 2, and tests for significance of factors

	Type of target items			**Statistical Analysis**	
	subject pronoun / low plausibility	object pronoun / low plausibility	object pronoun / high plausibility	factor: plausibility	factor: pronoun position
Experiment 1 Forced choice task, in-lab (% choice of intra-sentential referent indicating coconstrual)	2.9%	12.0%	30.8%	$\beta = 3.2866$ SE = 0.4125 $p < 0.001$	$\beta = -1.5654$ SE = 0.2901 $p < 0.001$
Experiment 2 Judgment task, in-lab (% coconstrual)	2.1%	10.1%	16.2%	$\beta = -2.8615$ SE = 0.5996 $p < 0.001$	$\beta = -1.0839$ SE = 0.4823 $p < 0.05$
Experiment 2 Judgment task, online (% coconstrual)	2.6%	7.9%	14.6%	$\beta = -2.1893$ SE = 0.5759 $p < 0.001$	$\beta = -0.8604$ SE = 0.4549 $p < 0.05$

5. General Discussion

As originally formulated by Chomsky (1981), binding relations between a pronoun and a name are categorically constrained by the syntax: if a name is c-commanded by a co-indexed pronoun, coconstrual between the two is ruled out *tout court*. In more recent years, researchers have offered a handful of counterexamples accompanied by introspective judgments to illustrate that pragmatics and discourse pressures conspire to

allow coconstrual in instances where structural relations would bar it (Bolinger 1977; Büring 2005; Chien & Wexler 1990; Evans 1980; Grodzinsky and Reinhart 1993; Harris and Bates 2002; Higginbotham 1985; McCray 1980; Reinhart 1983; Safir 2004; Sag 2000). While a few key theoretical proposals have been presented to account for these exceptions, they do not explicitly identify the specific factors that give rise to such judgments on a systematic basis, and either do not account for the full range of counterexamples, or overgenerate acceptability judgments across contexts.

The goal of the present research was to take these counterexamples and previous theoretical proposals as a jumping off point for moving beyond the role of Principle C in establishing coconstrual, and to pair them with experimental evidence from sentence processing and the interpretation of comparatives with pronouns to investigate the role of two key factors: structural position of the c-commanding pronoun and plausibility. Our findings add to the mounting evidence that Principle C alone is insufficient to explain the full range of coconstrual judgments. However, they go above and beyond previous approaches to precisify the conditions under which structurally illicit coconstrual is allowed. Succinctly put, our findings allow us to begin to make clear predictions about which environments involving a Principle C violation will or will not give rise to coconstrual. (In a parallel set of research, we extend our investigations successfully to other linguistic (pragmatic) environments known to affect sentence interpretation and provide further evidence for the role of information structure and processing in the evaluation of coconstrual relations.)

Our results offer three main takeaway points, which are not predicted by previous

theoretical proposals, but fall out easily from the discussion earlier in the paper regarding the role of processing, conceptual representation, and syntactic structure.

First, the control (forward anaphora) sentences that are not subject to Principle C demonstrate that when Principle C is not invoked, plausibility of coconstrual strongly influences participant interpretations. When we moved to target sentences with structurally illicit coconstrual, plausibility continued to play a role. Even in cases where Principle C would rule it out, when plausibility of coconstrual was high, many participants were likely to select an intra-sentential referent for the pronoun.

Second, plausibility did not exert an influence across the board. Controlling for plausibility, we found that the structural position of the c-commanding pronoun matters. Coconstrual in structurally illicit cases is significantly more likely when the pronoun is in object position than in subject position.[12] The specific construction type (i.e., DO or ECM) did not matter; what mattered was the position of the c-commanding pronoun.

Third and final, the results did not hold across *all* participants: as shown in Fig. 4 and Fig. 5, certain speakers were more willing than others to select an intra-sentential referent when Principle C disallowed it. These speakers were not simply more inclined to allow coconstrual with names in syntactically illicit positions across the board, since they uniformly rejected coconstrual in target sentences with a pronominal subject and in those with low plausibility of coconstrual (Fig. 3), but they increasingly allowed structurally illicit coconstrual under the influence of a combination of two specific factors:

[12] We say this with the caveat that this was in the absence of any explicit prosodic manipulation as a result of manipulating information structure or focus.

plausibility and non-subject position of the pronoun. We take this inter-participant variability as an indication that for those participants who strictly adhered to Principle C, either these factors do not play a role in assigning interpretations, or else they are ranked lower than Principle C in a type of optimality theoretic approach to interpretation, meaning that when Principle C marks the sentence as *, this is the final word. Thus, while traditional Principle C constraint is sufficient for determining coconstrual relations for some participants, for many others, additional factors intervene, and may carry more weight than structural constraints on binding (in a given context).

Status of Principle C in the grammar

Having demonstrated the role of these additional factors, where does this leave us with respect to the status of Principle C? Here, we consider two main hypotheses. The first is that Principle C is precisely as it stands: a categorical binary constraint that rules coconstrual out or in, depending on the structural relation between a name and a coindexed item c-commanding it. The revision we would then have to add in order to account for the data is that it is only one of multiple weighted factors, and is therefore violable. One way to conceptualize this state would be to view Principle C as one of the universal but violable constraints in a relative language-specific ranking, as proposed within the framework of Optimality Theory (Prince and Smolensky 1993/2004). If we consider Principle C as a binary constraint that occupies a particular position in such ranking, then it may interact with a requirement that the utterance yield a plausible interpretation based a pragmatic principle, which calls for minimization of speaker effort and selection of the most coherent reading (see, e.g., Atlas & Levinson 1981; Blutner

1998; Horn 1984). (We return to the issue of pronominal position shortly.)

Given the different response patterns observed within our participant groups, in an OT framework, we might assume that we are dealing with two distinct groups of speakers that differ with respect to their constraint rankings: one where Principle C is most highly ranked, and another where it is ranked below at least one other constraint (e.g., plausibility). This assumption then leads us to the conclusion that we're observing two distinct grammars. Given that all participants converged by responding uniformly to control items and target items with low plausibility of coconstrual, the difference in ranking is only observable when Principle C assigns a * to a coconstrual interpretation and other factors favor coconstrual.

The possibility that distinct populations of speakers who differ with respect to a specific, fundamental aspect of the grammar might be found within a broader population of native speakers (and not detected otherwise) is not unheard of. Indeed, Han, Musolino, & Lidz (2007) propose, based on experimental evidence from interpretations of scopally ambiguous sentences, that there are two grammars of Korean V-movement – one that has V-raising and the other I-lowering. But why would two grammars surface? Han, Musolino, & Lidz (2007) appeal to the Poverty of the Stimulus, arguing that children acquiring the language are presented with data that are consistent with the two competing grammars (Kroch 1989; Roeper 1999; Santorini 1992; Taylor 1994; Yang 2000), and therefore, given that the data are insufficient for distinguishing between two possibilities that differ in the competing grammars (i.e., parameter settings or constraint rankings), children randomly choose between one or the other. In our phenomenon of inquiry, it is

possible that for all intents and purposes, the two grammars yield the same grammaticality judgments for the vast majority of sentences that speakers would encounter where the binding principles are implicated. The backwards anaphora subject to Principle C is one of a few cases in which the two grammars could be detected. But even when the interpretations diverge for these constructions, the discourse context, the common ground, or a subsequent follow-up sentences might be enough to reconcile momentarily conflicting interpretations between speaker and hearer and resolve the referential ambiguity as intended.

That there could be variation with respect to how Principle C is encoded in the grammar is also not unheard of. In fact, Lasnik (1989) observed that Thai diverges from languages such as English by allowing coindexation between two r-expressions in a c-command relation, leading him to propose that some languages, such as Thai, do not adhere to Principle (or Condition) C, but rather a Condition D instead. Subsequent authors (e.g., Hoomchamlong (1991)) observed further constraints on these coconstrual relations – i.e., that coindexation is only possible (and Principle C violable) when the r-expressions are exact copies (e.g., are names). A further possibility, however, is that Thai *does*, in fact, respect Principle C, as stated for English and other languages, but that in Thai, certain r-expressions – names in particular – are invisible to Principle C (Larson 2005), unless modified by a classifier or demonstrative, and while children may start out with universal expectations about the implementation of Principle C in their language, they have to learn language-specific differences in how their language treats r-expressions and how Principle C is instantiated (Deen & Timyam 2018). With this in

mind, an alternative to the two grammars is possible: our participant groups do not differ in their *grammars*, per se, but in how they treat the r-expressions that participate in the c-command relations. Future research could explore this possibility by probing a range of r-expressions beyond a c-commanding pronoun and a c-commanded name (as in the target items in our studies). An interesting manipulation would be to replace the pronoun with a name, and to replace one or the other with a definite description.

The second possibility is that the data call for a re-formulation of Principle C. Instead of a constraint that categorically rules out coconstrual in cases when a name is c-commanded by and coindexed with its intended antecedent, it more weakly marks such coconstrual relations as *disfavored* or *disadvantaged*. One instantiation of this option is found among the competition-based approaches to the binding theory. Safir (2014: 102) proposes to reformulate the syntactic restriction on backwards anaphora as Syntax-Induced Obviation, as stated in (35).

(35) If X can be a binder for D-bound in position Y and Y is not D-bound, then X and Y are not expected to be coconstrued (i.e., they are obviative).

Unpacking this theory-specific terminology, Syntax-Induced Obviation states that if X c-commands Y, and at the same time Y is not a dependent pronominal form (feature-compatible A-bound variable) (such as the cases in our target sentences), this creates an *expectation of non-coconstrual* between X and Y. Thus, coconstrual is not *barred per se*, but marked as unexpected. Safir further notices that this expectation can be overridden, given the right pragmatic conditions (although what these conditions are, or what is meant by their being "pragmatic" is unclear).

The data may support this hypothesis in two ways. First, under this approach, while coconstrual is marked as *unexpected* due to structural positioning of the name vis-à-vis the pronoun, it is not deemed *a priori* impossible; it surfaces when conditions favor it. We have concretized two such factors: plausibility (which may be considered a conceptual or interpretive factor related to the discourse context and coherence) and structural position of the pronoun (with non-subject pronominal position favoring coconstrual). Thus, we can predict fairly precisely when this prior expectation can or cannot be overridden: in those instances where plausibility of coconstrual is high (e.g., given previously encoded schemata and the context at hand) and where the c-commanding pronominal occupies object position (again, in the absence of prosodic manipulation). Second, Safir's expectation of non-coconstrual may, in principle, vary in strength and, as a result, may require more or less support from non-syntactic factors to be overridden. While the syntactic component consistently imposes restriction on coconstrual for all speakers, individual experiences in the world – and therefore the strength with which a schema is encoded in a speaker's memory – may vary. This variability in strength could result in the variation in the distribution of answers we observed individual participants.

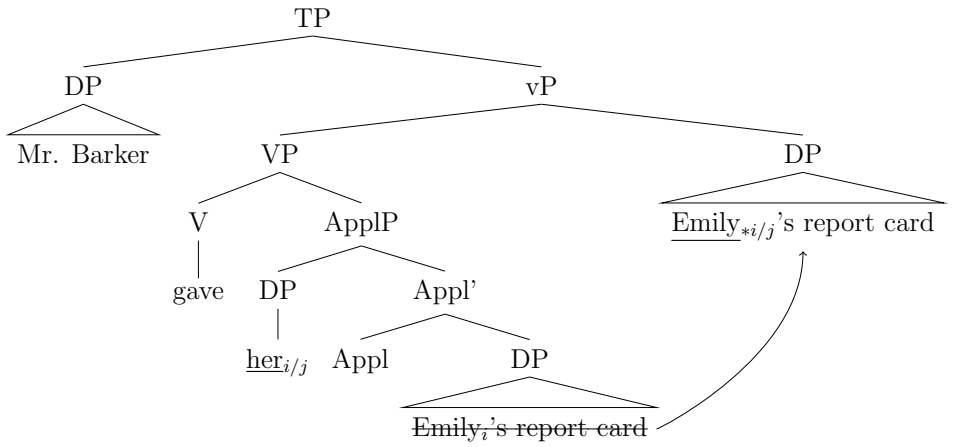
We see an important goal of future research as obtaining systematic empirical data to adjudicate between these two competing hypotheses, in order to more tightly explain the way in which Principle C is represented in the grammar and the extent to which other factors interact with this binding constraint.

Structural position of the c-commanding pronoun

We have presented a reason why plausibility should exert an influence on establishing coconstrual relations, but why should the second factor, the structural position of the pronoun, matter? Here, too, there are two possibilities. The first is that, when coconstrual is plausible, the parser attempts to accommodate the interpretation by reanalyzing the structure of the sentence and, as a result, to propose a representation where the name is no longer in the c-commanding domain of pronoun, similar to structural reanalysis that occurs with garden path sentences (Ferreira & Henderson 1991; Frazier & Rayner 1982). The process would look something like this. A speaker appears to intend coconstrual where the syntax doesn't license it. A listener is charitable and Gricean, and thinks that the speaker must be adhering to grammar, especially if the interpretation is a plausible one. As a result, the listener looks for a way to license the coconstrual relation intended by the speaker within the confines of the grammar and resort to a structural reanalysis of the original parse, in order to create a structure which makes the coconstrual licensed.

In the case of our data, one possibility of such structural reanalysis is extraposition of the constituent that includes the name, structurally similar to heavy NP shift (Ross 1967; Kayne 1998). The extraposed XP would then adjoin to vP, higher and to the right of the non-subject pronoun (Fox and Nissenbaum 1999), as shown in Fig. 6 for target item (31). However, such extraposition would not change the c-commanding relation between the subject pronoun and the name, since the landing site would still be dominated by Spec TP.

Figure 6. Alternative structural representation with object extraposition for target item (31).



While it may seem appealing to contain the argument within the domain of syntax, the extraposition hypothesis does not appear to be enough to singlehandedly explain the influence of pronominal structural position. First of all, structural reanalysis is cognitively costly (Fodor & Ferreira 1998; Frazier & Clifton Jr. 1998) and limited significantly by the parser's ability to access and revise the structure in working memory (Ferreira & Henderson 1991; Frazier & Clifton Jr. 1998; Sturt 1996; Van Dyke & Lewis 2003). Second, the extraposition hypothesis leaves us with an irresolvable dilemma: either the name that has been extraposed reconstructs back into the c-commanding domain of the pronoun at LF (e.g., Fox 1999; Freidin 1986), or else it remains at the extraposition site, no longer dominated by the pronoun (e.g., Safir 1999; Kuno 2004). The former predicts that there should be no asymmetry between pronominal positions, since both subject and non-subject cases would give rise to a Principle C violation, assuming that Principle C is evaluated at LF (Chomsky 1981; Chomsky and Lasnik 1993). The latter predicts that extraposition should bleed Principle C for non-subject

pronouns. While this situation gives rise to the subject-object asymmetry we report, it opens the floodgates for coconstrual to occur when the pronoun is in non-subject position and erroneously predicts that there should be near-ceiling acceptability for pronouns in object position, which is not the pattern that we observed. Thus, the subject-object asymmetry remains unexplained regardless of the side one picks in debate about argument reconstruction (see Bruening & Al Khalaf (2018) for a review). It is thus unlikely that our findings can be explained by appealing to the process of extraposition.

The second possibility regarding the influence of the structural position of the pronoun is tied to incremental processing and information structure. When a pronoun occupies subject position, it cues the parser in two distinct ways to conduct a search for an extra-sentential antecedent, one having to do with information structure, and the other having to do with the order of operations triggered in incremental processing. First, pronouns in subject position – a position in which topics are typically realized – facilitate coherence between two clauses (the one preceding the target sentence, and the target sentence itself), and signal to the listener that the referent is most likely one that is already in the common ground, or given (Arnold et al. 2013; Kaiser 2011; Strube & Hahn 1996, 1999). Consistent with this observation is the fact that pronouns are triggers whose presuppositions are not easily accommodated if there is not a salient referent of the gender indicated the pronoun (e.g., a salient female for *she*). So the speaker's use of a pronoun in subject position should signal to the listener that a referent has previously been mentioned or made salient in the discourse somehow, and that this is the antecedent for the referent. Backwards anaphora by definition goes against this pattern. At the same

time, when the pronoun occupies subject position (a typically sentence-initial position, as in our target sentences), it is encountered prior to other content in the matrix clause. Thus, the parser is straightaway engaged to launch a search for the referent, and may thereby immediately activate the syntactic binding constraints (i.e., Principle C). Even for speakers whose grammar allows for plausibility to be ranked above the binding constraint, the parser has been cued to consider Principle C first, before conceptual or semantic plausibility can be considered. When instead a name DP occupies the subject position, and the pronoun follows as an object, the search for the referent is not launched until both the subject and the predicate have been introduced. This sequential difference has the following consequence. As the hearer incrementally processes the sentence, they start to build up a syntactic-semantic representation, which is compared against the respective conceptual and semantic representations encoded in memory that give rise to expectations about what is plausible with a given situation. Because these representations are accessed earlier than the pronoun, factors such as plausibility are allowed to influence judgments of coconstrual relations before restrictions on binding are evoked.[13] In this way, a factor related to processing and information structure (structural position of the pronoun) feeds into a factor related to interpretation (plausibility), leading to the

[13] Gor (2017) and Syrett and Gor (in press) make similar arguments about the availability of coconstrual in subject comparative constructions resulting from the comparative morpheme triggering the comparison of alternatives prior to the parser encountering an object pronoun (e.g., *More people wanted her to go to Aspen than to Mary's hometown*.).

combined effect of both factors favoring coconstrual, in spite of Principle C's constraints.

This proposal also offers a possible alternative explanation for the reported contrasts between Principle C and Principle B observed in both adult and acquisition studies (see e.g., Chien and Wexler 1990; Conroy et al. 2009; Elbourne 2005; Grodzinsky and Reinhart 1993; Kazanina et al. 2007; Thornton and Wexler 1999). Previous researchers have argued that the two binding principles should be analyzed as involving different processing mechanisms: Principle C is conceived of as an initial hard-and-fast filter barring comprehenders from even considering a link between a pronoun and an R-expression in its c-commanding domain (e.g., Kazanina et al. 2007), while Principle B acts as a late filter allowing for temporary consideration of ungrammatical antecedents (e.g., Conroy et al. 2009). However, there is a confound in these previous studies. In studies on Principle C, the pronoun typically appeared in the subject position, while in the studies on Principle B, the pronouns were in a non-subject position. See, for example, (36)-(37).

(36) **She** washed Mama Bear. (Thornton & Wexler 1999: 107)

(37) Is Mama Bear touching **her**? (Chien & Wexler 1990: 271)

(38) Because last semester **she** was taking classes full-time while Kathryn was working two jobs to pay the bills, Erica felt guilty. (Kazanina 2007: 390, Table 1)

We hypothesize here that the reported contrast in processing does not stem from the inherent differences in the nature of the two syntactic principles, but rather from the *position* of the pronoun relative to other DPs in the data. With a pronominal subject, the structural condition on binding is evoked early in processing, while with a pronominal

object, the restriction on binding is activated later, allowing time to incorporate non-structural information into the assignment of interpretation. Future research should investigate this proposal in more detail in order to probe the nature of the connection between syntactic binding constraints, structural position, and incremental sentence processing.

6. Conclusion

In this paper we have presented experimental evidence that participants allow coconstrual in situations where Principle C would prohibit it, but have shown that in such cases, coconstrual is not permitted haphazardly or across the board. Rather, it is influenced by plausibility (which we have operationalized appealing to the concept of a schema) and by structural position of the pronoun c-commanding a name. We have argued that those two factors interact with one another and with the structural restriction on coconstrual: structural position of the c-commanding pronoun implicates information structure and incremental processing of content, which opens the door for plausibility (and perhaps other factors) to step in and exert their influence on potential coconstrual. As a result, when faced with a structurally illicit coconstrual, a listener may (or may not) take into account non-syntactic factors to arrive at the most likely interpretation intended by the speaker. We have also shown that many, but not all, participants allow for Principle C to be overridden, which raises intriguing and fundamental questions about the very nature of Principle C in the grammar of English speakers.

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Appendix A: List of triplets of stimuli used in the norming study and Experiments 1 and 2, categorized by predicate/construction

Test Sentences

DO construction

1. *gave*

   norming

   a. Emily gave Tommy her phone number.

   b. Mr. Barker gave Emily her report card.

   c. Richard gave Emily her contact information.

   Experiments 1, 2

   d. She gave Tommy Emily's phone number.

   e. Mr. Barker gave her Emily's report card.

   f. Richard gave her Emily's contact information.

2. *bring*

   norming

   a. Emily brought Ted her homemade brownies.

   b. The waiter brought Emily her choice wine.

   c. Jeff bought Emily her oil painting.

   Experiments 1, 2

   d. She brought Ted Pamela's homemade brownies.

   e. The waiter brought her Pamela's choice wine.

f. Jeff bought her Pamela's oil painting.

3. *offer*

norming

a. Emily offered Jack her class notes.

b. The waiter offered Emily her favorite entrée.

c. Mark offered Emily her book to read.

Experiments 1, 2

d. She offered Jack Pamela's class notes.

e. The waiter offered her Pamela's favorite entrée.

f. Mark offered her Pamela's book to read.

4. *send*

norming

a. Emily sent Grandfather her oatmeal cookies.

b. The consulate sent Emily her visa.

c. Jason sent Emily her new paper for review.

Experiments 1, 2

n/a

5. *show*

norming

a. Emily showed Max her diary.

b. Mr. Tomkins showed Emily her new desk.

c. Ben showed Emily her live broadcast.

Experiments 1, 2

d. She showed Max Emily's diary.

e. Mr. Tomkins showed her Emily's new desk.

f. Ben showed her Emily's live broadcast.

ECM Construction

6. *believe*

norming

a. Emily believed the doctors to have her scan results.

b. The classmates believed Emily to have finished writing her essay.

c. The gallery owners believed Emily to admire her painting.

Experiments 1, 2

d. She believed the doctors to have Emily's scan results.

e. The classmates believed her to have finished writing Emily's essay.

f. The gallery owners believed her to admire Emily's painting.

7. *believe*

norming

a. Emily believed the medicine to have helped her father.

b. Grandpa Nick believed Emily to be visiting her twin sister.

c. Steven believed Emily to have never met her best friend.

Experiments 1, 2

d. She believed the medicine to have helped Pamela's father.

e. Grandpa Nick believed her to be visiting Pamela's twin sister.

f. Steven believed her to have never met Pamela's best friend.

8. *allow*

norming

a. Emily allowed the social workers to speak with her daughter.

b. The doctors allowed Emily to visit her grandfather in ICU.

c. Mom and Dad allowed Emily to go on a date with her older brother.

Experiments 1, 2

d. She allowed the social workers to speak with Pamela's daughter.

e. The doctors allowed her to visit Pamela's grandfather in ICU.

f. Mom and Dad allowed her to go on a date with Pamela's older brother.

9. *allow*

norming

a. Emily allowed James to read her personal correspondence.

b. Mr. Mathews allowed Emily to resubmit her paper.

c. Mr. Adams allowed Emily to borrow her notes for the exam.

Experiments 1, 2

d. She allowed James to read Emily's personal correspondence.

e. Mr. Mathews allowed her to resubmit Emily's paper.

f. Mr. Adams allowed her to borrow Emily's notes for the exam.

10. *expect*

norming

a. Emily expected the detectives to find her birth mother.

b. Mr. Schulz expected Emily to explain the project to her colleagues.

c. Mr. Gordon expected Emily to invite her brother to the prom.

Experiments 1, 2

n/a

11. *expect*

norming

a. Emily expected the nurses to understand her condition.

b. Tod expected Emily to be at her desk.

c. Mark expected Emily to enjoy her book.

Experiments 1, 2

n/a

12. *need*

norming

a. Emily needed the police to protect her family.

b. The dentists needed Emily to bring her daughter in.

c. The girls needed Emily to steal her boyfriend.

Experiments 1, 2

d. She needed the police to protect Pamela's family.

e. The dentists needed her to bring Pamela's daughter in.

f. The girls needed her to steal Pamela's boyfriend.

13. *need*

norming

a. Emily needed the HR department to seal her personal file.

b. The parents needed Emily to sell her car.

c. Jack needed Emily to buy out her share of the company.

Experiments 1, 2

n/a

14. *want*

norming

a. Emily wanted the doctors to cure her mother.

b. The grandparents wanted Emily to share a room with her sister.

c. Tim wanted Emily to meet her cousin.

Experiments 1, 2

d. She wanted the doctors to cure Emily's mother.

e. The grandparents wanted her to share a room with Emily's sister.

f. Tim wanted her to meet Emily's cousin.

15. *want*

norming

a. Emily wanted Tim to watch her favorite movie.

b. Mr. Richards wanted Emily to submit her homework.

c. Mr. Clark wanted Emily to borrow her laptop for the presentation.

Experiments 1, 2

d. She wanted Tim to watch Pamela's favorite movie.

e. Mr. Richards wanted her to submit Pamela's homework.

f. Mr. Clark wanted her to borrow Pamela's laptop for the presentation.

Control sentences

Forward anaphora, high plausibility of coconstrual

1. Emily’s coach is really pleased with her.
2. Pamela’s dad took her to Six Flags last weekend.
3. Emily’s dog bit her yesterday.
4. Pamela’s mom took her to a day spa over the weekend.
5. Emily’s car let her down again last week.
6. Pamela’s friends were planning a surprise birthday party for her.
7. Emily’s classmates enjoyed her presentation a lot.

Forward anaphora, low plausibility of coconstrual

8. Emily's story brought her to tears.
9. Pamela's outburst surprised her a lot.
10. Pamela's car drove by so quickly that she jumped.
11. Emily's dancing was so captivating that she could not look away from the stage.
12. At the next table was Emily's fiancé, whom she had never met before.
13. Pamela's talk was so interesting that she forgot she needed to leave early.

14. Emily's speech was so long that she started to fall asleep.

Appendix B: Instructions to participants

Norming Study

During this study you will be presented with a number of sentences. Each of those sentences includes a name (e.g., Emily) and a possessive phrase (e.g., her table, or her neighbor). In each case we would like you to consider the situation described by the sentence, and then think about the following:

Which of the following two options is more likely?

"her" refers to Emily, i.e., "her car" means "Emily's car, or

"her" refers to another female not mentioned in this sentence.

We would further like you to use a scale from 1 to 5 to respond. It is critical that you study the table below carefully to understand which number corresponds to which answer.

1	2	3	4	5
it is **definitely** the case that **"*her*" means "*Emily's*"**	it is more **likely** that **"*her*" means "*Emily's*"**	both options are **equally likely**	it is more **likely** that **"*her*" means "*another girl's*",** and not "*Emily's*"	it is **definitely** the case that **"*her*" means "*another girl's*",** and not "*Emily's*"

Experiment 1: Forced-Choice Study

During this study you will read some sentences. Each sentence will report a fact about one of the two girls: Emily or Pamela. You will also see the images of the two girls on the screen. After you have read the sentence you will be asked to **select the girl you**

think the sentence was about. In other words, **your job is to figure out whether the "she" or the "her" in the sentence was about Emily or Pamela**. To make your selection, press E or P on the response pad. Once you respond, the experiment will automatically move on to the next sentence.

Experiment 2: Judgment Study

During this study you will read some sentences. Each sentence will report a fact about a girl named Emily. Each sentence will include a name (**Emily**) and a pronoun (**she** or **her**).

For each sentence, please answer the following question:

Can the name and the pronoun refer to the same person, or not?

In other words, your task is to figure out whether the "**she**" or the "**her**" in the sentence means "**Emily**" or another girl not mentioned in this sentence.

We will begin with a brief training to get you comfortable with the task.