Dispelling the Cloud of Unknowing

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Abstract: Collins and Postal (2014) present an argument for a syntactic analysis of Classical NEG Raising based on what they dub *Horn clauses* (see Horn 1975: 238), illustrated by the italicized clause in (i):

(i) I don't think that *ever before have the media played such a major role in a kidnapping*.

The analysis proposed strongly supports certain assumptions and conclusions in Collins and Postal (2014) including the existence of NEG deletion and the idea that NPIs are properly analyzed as negative phrases (contrary to mainstream analyses of NPIs).

Horn (2014) develops a critique of Collins and Postal's Horn clause argument based on properties of a nonfactive use of the verb *know* (and a few other similarly behaving predicates). This paper is a reply to Horn's critique.

After showing that Horn (2014) fails to account for the fact that Horn clauses are a subset of clauses manifesting Negative Inversion, we offer an alternative account of the basic data in Horn (2014). We show how this new treatment is consistent with the syntactic account of Classical NEG Raising in Collins and Postal (2014).

Keywords: Classical NEG Raising, Horn clauses, quasi-Horn clauses, islands, Negative Inversion, negation, negative polarity items, NEG deletion, non-factive *know*, parentheticals.

1. Background

Classical NEG Raising (henceforth: Classical NR) is a grammatical phenomenon defined informally *in the simplest cases* by situations in which a negative element NEG in a main clause is interpreted as having scope in a complement clause; see Horn (1978, 2001: 5.2) and Collins and Postal (2014) (hereafter: CP (2014)) for much background discussion and references to the relevant literature. English examples are provided in (1a-d):

(1) a. Harriet did not seem to be agitated.

b. Vincent is not likely to win the election.

c. They didn't believe that Rodney would testify.

d. I don't suppose Helen can afford a new smartphone.

e. No professor thought that Vera knew a fucking thing about compressors.

Example (1a) has a reading equivalent to the claim that Harriet seemed not to be agitated, while (1b) has a reading equivalent to a claim that Vincent is likely not to win the election. Sentence (1c) has a reading equivalent to a statement that they believed that Rodney would not testify and (1d) has a reading where the speaker supposes that Helen cannot afford a new smartphone. These are the Classical NR readings. But traditionally it has also been recognized that the interpretation of sentences like (1e) (involving a main clause negative DP and no *overt* NEG which can plausibly be taken to have raised) is parallel in some ways to the interpretation of (1a-d). CP (2014) devotes all of its chapter 16 to arguing that cases like (1e) do indeed involve syntactic NEG raising in the same sense as simpler cases like (1a-d) (the evidence is based on syntactic islands and Horn clauses). However, in such cases, the raised NEG must be taken to be covert.

Classical NR readings are known to depend on the choice of the main clause predicate. So, for instance, substitution of *claim* for *seem* in (1a), *certain* for *likely* in (1b), *testify* for *believe* in (1c), *dream* for *suppose* in (1d) or *propose* for *think* in (1e) yields examples lacking Classical NR readings. Following CP (2014) we refer to those predicate elements which do permit Classical NR as *Classical NEG Raising Predicates* (CNRPs). See Horn (1978) for a detailed attempt to characterize the class of CNRPs.

In CP (2014), Classical NR is taken to be defined by syntactic raising of a NEG from a complement clause where it originated into a containing main clause. As noted there, this is a highly controversial view; most current approaches to Classical NR take it to be a purely semantic or pragmatic phenomenon in which syntactic NEG raising plays no role whatever (e.g., Jacobson 2006) ; see Gajewski (2007) and Romoli (2012) for recent analyses of a nonsyntactoc type and relevant references.

CP (2014) develops what we consider a powerful argument for a syntactic view of Classical NR based on the existence of subordinate constitutents that we called *Horn clauses*. Apparently first attested in Horn (1975: 283), these are illustrated by the italicized segments of such examples as (2a-d):

(2) a. We don't believe *that in any sense has she met the minimal requirements*.

b. No one supposes *that any of those proposals will the director sign off on*.

c. I don't think that *any of those space aliens will we be able to catch.*

d. I do not think *that ever before have so many space aliens visited Earth*.

e. One would never have imagined that *any such people could be elected to the senate.*

The basic defining characteristics of such clauses are (i) the presence of an extracted NPI phrase (e.g. *in any sense* in (2a)) in the embedded clause, (ii) the obligatory occurrence of subject

auxiliary inversion in the embedded clause and (iii) the occurrence in the main clause of some form of negation.

The argument in CP (2014) hinged on a claimed restriction on Horn clauses due originally to Horn (1975: 283; 1978: 169) (in addition to the properties in (i)-(iii) above). The restriction is that Horn clauses are limited to occurrence within the complements of verbs independently permitting Classical NR, that is, complements of CNRPs. However, Horn (2014) develops a critique of the Horn clause argument developed in CP (2014). This critique is based specifically on the properties of a nonfactive use of the verb *know,* which Horn calls *know-NF,* a terminology we adopt. We will call the argument he seeks to develop on this basis the *anti-Horn clause argument,* hereafter, *Anti-HC*. We will argue that this argument does not have the force against a syntactic view of Classical NR that Horn takes it to have and claim that the properties of *know*-NF and other similar predicates strongly support the basic syntactic assumptions of CP (2014).

2. Classical NR According to Collins and Postal (2014)

In this section, we briefly sketch the syntactic analysis of Classical NR and Horn clauses found in CP (2014). Consider Horn's (1975: 238) orginal Horn clause example (3):

(3) I don't think that ever before have the media played such a major role in a kidnapping.

For CP (2014), the analysis of (3) is closely related to that of (4); the analyses of both are represented in (5). Hereafter, for simplicity we suppress the phrase *in a kidnapping* from our representations of (3).

(4) I think that never before have the media played such a major role.

(5) a. I think that the media have [NEG_1 SOME ever before] played such a major role.

b. I think that [NEG_1 SOME ever before] have the media played such a major role.

c. I do NEG_1 think that [<NEG_1> SOME ever before] have the media played such a major role.

In (5a), the main clause NEG_1 originates in the embedded clause in a constituent [NEG_1 SOME ever before], and [NEG_1 SOME ever before] appears in a preverbal adverbial position. In (5b), the extraction of this constituent illustrates Negative Inversion (see section 4 for a discussion of this construction) to the initial position of the embedded clause. Negative Inversion invariably requires subject-auxiliary inversion. We take (5b) to be the key component of both (3) and (4). In (5c), NEG_1 raises to the matrix clause. Here and hereafter we follow CP (2014) in utilizing the notation <X> to represent covert instances of the syntactic constituent X. Hence <NEG_1> represents the lower, unpronounced occurrence of NEG_1.

Three key assumptions in the above account are (a) *ever before* in (3) (as *never before* in (4)) is analyzed as a negative structure [NEG SOME ever before]; (b) Negative Inversion is triggered by negative XPs, and (c) Classical NR raises NEG_1 out of the embedded clause to form (3). Non-raising of that NEG yields (4) from the same initial structure. So the syntactic difference between (3) and (4) is just whether the option of Classical NR is taken or not.

A crucial component in this analysis is that NPI phrasess can determine Negative Inversion in Horn clauses. This is not anomalous because the fundamental feature of the analysis of NPIs in CP (2014) is that such phrases, e.g. *ever before* in (3), are just negative phrases (the elements par excellence which determine Negative Inversion). What makes them NPI phrases is the covertness of their associated NEGs. As shown in CP (2014), treating NPIs as negative expressions has a great deal of independent motivation and in particular is the crucial element in accounting for the properties of Horn clauses. This follows because treating NPIs as negative

phrases (and only that assumption) can permit reduction of the Horn clause phenomenon to the independently existing Negative Inversion construction. Unfortunately, this point is overlooked in Horn (2014) and in fact in every other attempted semantic/pragmatic account of Classical NR and English NPIs that we are aware of.

3. Horn's Anti-Horn Clause Argument

Horn illustrates *know*-NF (non-factive *know*) with such examples as:

(6) a. I don't know that I can trust you.

b. How do you know he is is here?

Such cases lack the implication obligatorily found with the standard, factive usage of *know* that the embedded clause is true (see Horn 2014: 184).

Horn's critical discovery from the present perspective is the existence of many *know-NF* sentences whose complements appear to be Horn clauses. Additional examples are provided by the following Google hits:

(7) a. I don't know that EVER before had all three boys napped simultaneously. (www.vrbo.com/194521/reviews)

b. I don't know that ever before had the Army commander been in charge of the Naval forces. (www.americancivilwarforum.com)

We find Horn's examples grammatical and accept without condition the claim that these contain Horn clauses.

The core of Horn's Anti-HC argument based on such examples is the claim that *know-NF* is *not* a CNRP, which he supports by stating that:

(8) I don't know that P ≠ I know that not P

This formula, is, of course, to be understood as representing *know-NF*. The fact is then that examples whose main predicate is a negated *know*-NF do not have equivalents where the negation instead occurs in the complement clause. Contrast (8) with (9a, b), representing the kind of semantically equivalent pairs which originally motivate talk of Classical NR.

(9) a. I don't think that P = I think that not P

b. Alfred doesn't seem to understand Spanish = Alfred seems not to understand Spanish.

Horn's idea then is that the contrast between (8) and the standard semantic equivalence seen with uncontroversial CNRPs as in (9) shows that *know-NF* is not a CNRP. Given that, the claim of CP (2014) that Horn clauses exist because of Classical NR (as illustrated in (5) above) is seemingly undermined.

Moreover, Horn supports Anti-HC with observations to the effect that other forms which are by the same reasoning apparently also not CNRPs (because of the lack of equivalences like those in (9)) likewise permit Horn clauses, namely, *can't say* and *not aware*, as in the additional Google-provided examples in (10):

(10) a. I can't say that at any time did I have a problem with any of the customer service team. (www.reviewcentre.com/reviews182288.html)

b. I'm not aware that ever in the history of New York State has something like this happened. (issuu.com/downtownexpress/.../113011_de.indd)

We can add, that in our dialects, the expressions, *not certain, not confident, not evident (to me), not convinced, not persuaded, not obvious (to me), not positive, not recall, not sure,* and *can't swear* also appear to have the relevant properties Horn documents with *know-NF* and the forms in (10) (see section 10 on *doubt*, which has related properties).[1] That is, there are no semantic equivalences of the sort typical of Classical NR cases and Horn clause examples like

(11) are perfectly grammatical:

(11) a. I am not aware that at any time did they insult any of the applicants.

b. I am not certain that ever before have I met that person.

c. It is not obvious to me that in any sense is he qualified for that position.

d. I do not recall that at any point in time did I consent to their reprinting my article.

For convenience, we will call such predicates, including *know-NF, Cloud of Unknowing* (CU) predicates, and sentences where they occur as CU-sentences. So in this terminology, Horn's key discovery relevant to the overall argument in CP (2014) is that negated CU-predicates, although failing to manifest the semantic equivalences diagnostic of the simple cases of Classical NR, can take Horn clause complements.

Horn takes Anti-HC to undermine the claim of CP (2014) that Horn clauses provide an argument in favor of a *syntactic* view of Classical NR, as indicated below:

(12) Horn 2014: 190:

"The problem for this otherwise elegant argument for a syntactic rule of NR is that 'dichotomous' status is not a necessary property for triggering embedded subject-aux inversion…."

By 'dichotomous status' here Horn refers to equivalences like those in (9). Although agreeing with the factual patterns Horn documents, we reject the claim that they provide a refutation of a syntactic approach to Classical NR.

Despite the new, relevant body of data Horn has discovered, we will argue that CU-sentences with embedded Horn clauses are properly analyzed in terms of Classical NR. So from that point of view, in addition to simple cases like those in (1a-d) and more complex ones involving negative DPs in the main clause like (1e), there is at least a third type of structure

which involves Classical NR, that represented in (6), (7), (10) and (11). CU-predicates and their properties were unknown to the authors of CP (2014), which consequently said nothing about them. In the CU cases, as in (1e), the system of CP (2014) requires recognition of covert instances of NEG. We discuss this aspect of our analysis in detail in what follows.

In the following sections, we seek to justify the claim that CU-sentences involve Classical NR and the view that they are compatible with the theoretical assumptions of CP (2014) in general. Specifically, section 4 discusses the fact that Horn's (2014) brief nonsyntactic account of Horn clauses fails to address the central claim about Horn clauses in CP (2014), namely, that these clauses manifest specific syntactic properties which show that they involve Negative Inversion. We sketch the argument from CP (2014) that Horn clauses involve Negative Inversion, and indicate why it provides a strong basis for a syntactic view of Classical NR. In section 5, we analyze what we call the *simplest* Classical NR approach to CU-sentences, one which we suspect Horn considers the *only* possible Classical NR analysis. We point out why this analysis is inadequate, but stress that in no sense does this indicate that there is no viable syntactic Classical NR analysis. Section 6 outlines a syntactic Classical NR analysis of CU-sentences (distinct from the simplest one), pointing out that it overcomes the flaws in the simplest analysis. In section 7 we given an account of the possibility of strict NPIs in the complement clause of negated CU-predicates. Section 8 provides evidence from island constraints, parallel to that appealed to in CP (2014), that Classical NR also functions in CU-sentences involving Horn clauses and strict NPIs. Section 9 discusses Horn's observation (personal communication) that negated CU-predicates cannot appear in negative parenthetical clauses, which sharply distinguishes them from traditionally known CNRPs. We show this difference follows straightforwardly from the analysis in section 6. Section 10 discusses the fact

that Horn clauses can appear embedded under the verb *doubt*. We show that our section 6 analysis extends straightforwardly to *doubt*. Section 11 shows that while a negative DP as the subject of a CNRP licenses an embedded Horn clause (or strict NPI), a negative DP as the subject of a CU-predicate does not. Section 12 discusses what CP (2014) called *quasi-Horn clauses*, showing how they can be distinguished from Horn clauses embedded under negated CU-predicates. Sections 11 and 12 together show that Horn's proposed condition governing Horn clauses is both too strong and too weak (in addition to the problems outlined in section 4). Section 13 briefly discusses the semantic characteristics of CU-predicates and the relation between Classical NR with CNRPs and CU-predicates. Section 14 is the conclusion. The appendix provides a technical account of how principles stated and justified in CP (2014) account for many features of CU-sentences.

4. Horn's Proposal

While most of Horn (2014) is taken up with justifying Anti-HC on the basis of the properties of *know-NF* and similar CU-predicate cases, he also very briefly offers a *nonsyntactic* account of the conditions on Horn clauses, hence one sharply distinct from the syntactic NEG raising view in CP (2014). His proposal is given in full in (13):

(13) Horn (2014: 193)

> "The crucial factor in licensing embedded subject-aux inversion ("Horn clauses") and strict NPIs when these occur under higher negation in the sequence [**a** NEG-Fs that **p**] is not the requirement that F be a NR predicate per se but the existence of a robust association between **a** being in a **NEG-F** relation to **p** and **a** being in an **F′** relation to **¬p**, where **F′** = **F** or **F′** < **F** on a relevant scale."

To illustrate the ideas here, consider the case of *know-NF*, illustrated in (14):

(14) I don't know that ever before have the media played such a major role.

According to Horn, the Horn clause in (14) is acceptable, because (14) implies (15):

(15) I know-NF (or perhaps some weaker predicate like *think*) that the media have not at any point played a major role.

Horn does not specify if this latter proposition is an entailment, implicature or presupposition (he merely says "robust association"), so we will not take a stand here either. We will simply call it an *implication* (to remain neutral on how to model the association).

Critically though, claim (13) fails to capture (or even relate to) the generalization argued at length in CP (2014) to the effect that Horn clauses are a type of Negative Inversion clause. The Negative Inversion construction is illustrated by examples like those in (16):

(16) a. Not even one of them can we convince to vote for Leroy.

b. None of their applications will they agree to reconsider.

c. Not often have the authorities utilized that capability.

d. In not many cases did the judge agree with the defense.

e. The doctor found that not even one of Harvey's reported results could they replicate.

Horn clauses share two immediately palpable properties of Negative Inversion clauses. These are the presence of an extracted phrase in the clause initial position and a correlation between the presence of the extracted phrase and the obligatoriness of subject auxiliary inversion. Both uncontroversial Negative Inversion clauses and Horn clauses without subject auxiliary inversion are entirely impossible:[2]

(17) a. *None of them we can convince to vote for Leroy.

b. *I don't suppose that any of them we can convince to vote for Leroy.

Moreover, the claim that Horn clauses involve Negative Inversion is argued in CP(2014:142-144) on the basis of less immediately apparent considerations than those just cited. In particular, we documented that there exist a number of characteristic restrictions limiting both constructions, of which we cite only two:

(18) a. Carla will stop at nothing (won't stop at anything) to get that job.

b. *Nothing will Carla stop at to get that job.

c. *I believe that nothing will Carla stop at to get that job.

d. *I don't believe that anything will Carla stop at to get that job.

(18b) shows that *nothing* in the idiom *stop at nothing* cannot trigger Negative Inversion. (18d) shows a similar fact for *anything*. The correlation between (18b,c,d) follows trivially from the analysis in CP (2014) since Horn clauses like that in (18d) *are* Negative Inversion clauses whose central NEG element, contrary to that in its correspondent (18c), has raised into the main clause as a function of Classical NR.

The following examples support the same conclusion[3]:

(19) a. Boris will be no Einstein/will not be any Einstein.

b. *No Einstein will Boris be.

c. I figured that Boris would be no Einstein (would not be any Einstein).

d. *I didn't figure that any Einstein would Boris be.

But under an account like (13), no actual syntactic relation is taken to exist between Negative Inversion clauses and Horn clauses. Negative Inversion/Horn clause correlations like those in (18) and (19) would then turn out to be mere accidents. Since Horn clauses and Negative Inversion clauses would be unrelated, the same restrictions would have to be multiply stated in the grammar. That is, for a grammatical account of Horn clauses to fail to subsume them under

the Negative Inversion construction requires the complicating posit of *an entirely distinct English extraction construction*, one otherwise entirely unmotivated.

The conclusion that Horn clauses involve Negative Inversion is devastating for proposals about them which reject Classical NR understood as an instance of syntactic NEG raising, hence undermines Horn's proposal (13). The reason relates to the general conditions which must be met by any phrase fronted under Negative Inversion.

As discussed at length in CP(2014: chapter 14), Horn clauses aside, Negative inversion requires the presence of a NEG or, possibly, given cases like (20), the property that the extracted phrase is decreasing (or perhaps Strawson decreasing for *only*):

(20) a. Only some gorillas were they able to teach to tap dance.

b. Rarely were they able to go to outdoor concerts.

c. Very few people would they admit to their club.

d. Hardly ever had he talked to somebody so enlightened.

e. Less than half the class has Michael actually spoken to.

This condition on Negative Inversion (only a NEG-containing or decreasing phrase can be fronted) accounts for a massive range of data exemplified by:

(21) a. *That guy did they arrest last week.

b. *Some students did they offer special tutoring to.

c. *Most proposals by nonprofessionals did he refuse to consider.

d. *Every one of the incoming students did they offer remedial help to.

If Negative Inversion requires the presence of NEG or at least a decreasing function, then a very strong argument for a syntactic view of Horn clauses arises as follows; these remarks sharply compress the long discussion of chapters 13 and 14 of CP (2014), which the interested

reader should consult for a fuller account. This discussion expands the account given in section 2 above. For concreteness, we repeat (2c) as (22a):

(22) a. I don't think that any of those space aliens will we be able to catch.

b. Negative Inversion can only extract an XP if it contains NEG or defines a decreasing phrase.

c. On no standard analysis of NPIs do nominal NPIs represent phrases with a NEG or phrases defining decreasing functions. Rather, on generally accepted analyses, nominal NPIs (like e.g. *any of those space aliens)* are indefinites/existentials similar in meaning to *a space alien/some of those space aliens*, that is, they are nonnegative, nondecreasing phrases.

d. Therefore, if Horn clauses instantiate Negative Inversion, those NPI phrases that are extracted to form Horn clauses cannot, despite appearances, be treated as bare indefinites or existentials but must have a covert NEG associated with them.

e. So NPI phrases that have extracted to form Horn clauses must actually be underlying negative phrases, like *no space aliens*, analyzed as [[NEG SOME] space aliens] in CP (2014). The extraction of the NPI phrase in a Horn clause then just represents Negative Inversion, accounting for the fact that Horn clauses obey constraints on Negative Inversion, e.g. as in (18) and (19) above (and other constraints discussed in CP (2014)).

f. Since the NEG underlyingly associated with the fronted NPI phrase in a Horn clause is not *overtly* present in the embedded clause, it has arguably raised out.

g. These conclusions dovetail perfectly with a *syntactic* view of Classical NR because Horn clauses occur as complements to CNRPs, that is, to main clause predicates which permit Classical NR independently of Horn clauses. Thus in cases like (22a), the NEG in

the main clause of a structure with a Horn clause complement can be taken to be the NEG originating on the phrase extracted under Negative Inversion. This is exactly the NEG needed to permit the extracted phrase in the Horn clause to obey the conditions on Negative Inversion, sketched in (22b).

Curiously, Horn (2014) makes no attempt to address this central argument of CP (2014) for a syntactic version of Classical NR.

5. The Inadequacy of the Simplest Classical NR Analysis of CU-Sentences

Given the syntactic argument in section 4, the simplest approach to CU-sentences containing Horn clauses would be that a CU-predicate-based Horn clause example such as (23d) is a result of Classical NR with (23b) as its input (parallel to the analysis illustrated in section 2 for CNRPs):

(23) a. I know that the media have [NEG_1 SOME ever before] played such a major role.

b. I know that [NEG_1 SOME ever before] have the media played such a major role.

c. I do NEG_1 know that [<NEG_1> SOME ever before] have the media played such a major role.

d. I don't know that ever before have the media played such a major role.

The coindexing between the two occurrences of NEG_1 in (23c) then represents a Classical NR analysis. In (23b), NEG_1 modifies SOME and the extraction via Negative Inversion of [NEG_1 SOME ever before] to the clause initial position triggers inversion of the auxiliary. Then, (23c) is the consequence of the possibility of Classical NR operating on the NEG_1 of structures like (23b)

However, there are reasons to reject such a straightforward Classical NR analysis. First, as Horn (2014: 190) observed, claims that *know-NF* is a CNRP run up against the systematic

lack of equivalence between pairs of CU-sentence like those in (24):

(24) a. I don't know that Carol is the best candidate. ≠

b. I know that Carol is not the best candidate.

c. I can't say that ever before have the media played such a major role. ≠

d. I can say that never before have the media played such a major role.

e. I can't swear that he embezzled the money. ≠

f. I can swear that he didn't embezzle the money.

In general terms, the kind of semantic equivalences taken to motivate Classical NR in the simple cases are simply not found with CU-predicates.

Further, if cases like (24a, c, e) represented instances of a simple Classical NR analysis in which the overt main clause NEG has been raised from the complement clause, that NEG would in each case function semantically only in the complement clause. But in fact, each of these examples clearly involves main clause semantic negation.

Moreover, an even stronger basis for rejecting the simple Classical NR analysis represented in (23) can be based on the analysis of parenthetical clauses in chapter 17 of CP (2014). We discuss this in section 9 below.

While the simplest Classical NR analysis of CU-sentences is inadequate, we argue in the following section that there is nonetheless a syntactic Classical NR treatment of CU-sentences consistent with the data Horn has documented. So our acceptance of Horn's rejection of the simple analysis in (23b) is not at all equivalent to accepting the claim that there is *no* viable Classical NR account of CU-sentences.

6. A Covert NEG-Based Approach to Horn Clauses in CU-Sentences

Beyond giving an account of Horn's discovery that CU-sentences can take embedded Horn clauses, the analysis we propose will meet two further clear criteria. First, it must be consistent with the fact argued in section 3 that Horn clauses involve Negative Inversion. Second, as discussed in the previous section, the overt matrix NEG in CU-sentences must originate in the main clause and thus function semantically in that clause, not in the complement clause.

While these assumptions rule out structure (23c), they are consistent with the following structure:

(25) I NEG_1 know that [[[<NEG_2> SOME ever] before] have the media played such a major role]

Structure (25) contrasts with (23c) in that NEG_1, which modifies *know*-NF, is distinct from the NEG_2 modifying SOME. Hence in (25), NEG_1 has not been raised from the embedded clause. But the presence of NEG_2 as a modifier of SOME permits the resulting negative adverbial phrase to undergo Negative Inversion in the embedded clause. And the presence of unraised NEG_1 in the main clause correctly accounts for the semantically negated character of the higher clause.

But (25) cannot be the correct representation of (23d), since it yields an incorrect interpretation, one equivalent to that of (26):

(26) I don't know that never before have the media played such a major role.

That is, (25) has the wrong number of negative elements to represent the meaning of (23d).

The actual Classical NR analysis we propose for (23d) remedies the defect in (25) by adding an additional NEG to the complement, and is given in (27).

(27) I NEG_1 know that [<NEG_2> [[[<NEG_3> ever] before] have the media played such **a** major role]]

In this representation, there are three semantically and syntactically distinct NEGs. NEG_2 is a clausal modifier, modifying the embedded clause whose initial element is the phrase extracted under Negative Inversion. In the Principles and Parameters framework, NEG_2 would be adjoined to the embedded TP: [NEG_2 TP]. Crucially, NEG_2 and NEG_3 are not overt. We claim that they have been deleted. We return the deletion of the NEGs below, and in more detail in the appendix (see also chapters 7 and 8 of CP (2014)).

The general view of CP (2014), contrasting with many views about the distribution of syntactic negation, is that NEG can freely modify any category whose semantics is compatible with negation. Thus the possibility of the presence of elements like NEG_3 and NEG_2 in the positions where they are found in (27) requires no special stipulations. In particular, NEG_2 modifies the clause (denoting a proposition), and NEG_3 modifies a covert SOME (denoting a generalized quantifier).

We observe that unlike (25), (27) arguably yields the correct interpretation of (23d), one essentially equivalent to (28a) (which is in turn equivalent to (28b):

(28) a. I don't know that it is not the case that the media haven't ever before played a major role.

b. I don't know that the media have played a major role at some time before.

A key basis for this conclusion is that the occurrence of one negation under the scope of a distinct one yields a nonnegative result semantically. That is, the two NEGs in the embedded clause cancel the semantic effect of negation. In predicate logic notation: $\neg[\neg\exists xP(x)] \leftrightarrow \exists xP(x)$.

Given the interpretation in (28), it is implied that given my present understanding, it is possible that the media have never before played a major role. This inference follows from the following schema:

(29) a. Let p represent the proposition 'Never before have the media played such a role', the meaning of the inner clause of the complement clause of (27);

b. I don't know-NF that not p → It is possible (as far as I know) that p.

c. It is possible (as far as I know) that never before have the media played such a role.

d. $\neg\Box\neg p \leftrightarrow \Diamond p$

The inference in (29b) is the epistemic logic version of the modal logic inference in (29d). In other words, 'It is possible as far as I know' is the dual of *know-NF*. We feel that the implication found in (29) characterizes the relevant part of the meaning of (23d). Horn claims that the implication is stronger. Recall from (13) that Horn claims that there is "…a robust association between a being in a **NEG-F** relation to **p** and **a** being in an **F′** relation to **¬p**, where **F′** = **F** or **F′** < **F** on a relevant scale."

So in the cases at hand, [not know-NF p] should imply [know-NF not], or possibly [think/suspect not p]. The two relevant interpretations are given in (30):

(30) a. It is possible (as far as I know) that never before have the media played such a major role.

b. I think/suspect that never before have the medial played such a major role.

Clearly, (30b) is stronger than (30a). One can, for example, assert (30a) and deny (30b). We claim that the literal meaning of the construction is (30a) (as shown in (29) and (30)).

We stress that the semantic considerations just sketched are not particular to *know-NF* but can be taken to be characteristic of the class of CU-predicates. For instance, taking (31c) to be the structure of (31b), the pattern in (31) is parallel to that in (29):

(31) a. Let p represent the proposition 'none of them have I interviewed previously'

b. I am not certain that any of them have I interviewed previously.

c. I am NEG_1 certain that [<NEG_2> [[[<NEG_3> SOME ones of them]] have I interviewed previously]]

d. I am not certain that not p $\rightarrow$ It is possible (as far as I know) that p.

e. It is possible (as far as I know) that none of them have I interviewed previously.

Furthermore, we disagree with Horn that there is a "robust association" to a think-not interpretation. Consider the following examples:

(32) a. I am not convinced that at any point in time did Sue steal from the office fund.

b. There are just too many unanswered questions to draw a firm conclusion.

We find that (32b) is a felicitous continuation of (32a), which is consistent with the interpertations we give of negated CU-predicates in (29) and (31). If it is possible that Sue did not steal money from the office fund at any time, then one can give an explanation for that uncertainty by uttering (32b). But if there were a think-not implication (as claimed by (13)), (32b) would be a surprising continuation. If one thinks that Sue did not steal from the office at any point in time, then why continue by saying that there are just too many unanswered questions. Of course, one could say that the "robust association" described by Horn was an implicature, and that continuations like (32b) cancel that implicature. But then it is unclear what work the notion of "robust association" does in (13), since as (32) shows a Horn clause is possible in the absence of a think-not implication. So while there may be a think-not implicature in many cases of negated CU-predicates (including ones with strict NPIs and Horn clauses), such an implicature does not appear to have anything to do with licensing strict NPIs or Horn clauses.

We observe next that like the rejected (25), structure (27) provides both the NEG needed to account for the negative status of the main clause and the NEG needed in the fronted phrase of the Horn clause. As argued in detail in CP (2014) and above, the latter is necessary to satisfy the

conditions on Negative Inversion. As noted, Horn's account of CU-sentences in (13) fails to account for detailed parallels between Horn clauses and clauses uncontroversially manifesting Negative Inversion.

Relating (27) to the actual string of words represented by (23d) evidently requires that both NEG_3 and NEG_2 be covert. Appeal to this possibility takes advantage of our assumption that NEG deletion is a widespread grammatical feature of natural language syntax. This view, expanding that of Postal (2005), is argued for at length in particular in chapters 7 and 8 of CP (2014) and in fact at many other points in that work as well. In the framework of CP (2014), a deleted NEG is unpronounced (phonetically null), but still present for the purposes of interpretation. Chapters 7 and 8 of CP (2014) document the role of NEG deletion in a range of constructions in English and other languages. From that point of view, there is nothing remarkable about postulating NEG deletion to account for the properties of CU-sentences. The appendix below shows how NEG deletion with CU-predicates obeys all the general conditions on NEG deletion postulated in CP (2014).

The structure in (27) is incomplete in that we claim that NEG_2 is raised into the matrix clause (an instance of Classical NR). NEG_2 raises from the embedded clause to some position in the matrix clause lower than NEG_1. A possibility in the Principles and Parameter framework is that NEG is raised and adjoined to VP, although it does not matter for present concerns what the exact position of the raised NEG is. Because of the raising of NEG_2, (27) is in fact a Classical NR structure, but one where the overt NEG_1 in the matrix clause is not the NEG which has raised from the embedded clause. Key evidence for raising of NEG_2 to the matrix clause is that CU-sentences with Horn clause (and strict NPI) complements obey standard island constraints, as discussed in section 8.

The presence of Classical NR of NEG_2 in (27) raises the question of what forces Classical NR. As noted, in our analysis NEG_2 and NEG_3 need to be deleted. As reviewed in detail in the appendix, in the terms of CP (2014), this requires NEG_2 to raise to the matrix clause to be in a local relation to a c-commanding nonincreasing phrase. In the case of (27), this can only be the negated matrix verb. Since the details of this proposal are rather intricate we leave them to the appendix.

7. Strict Negative Polarity Items and CU-Sentences

In arguing for the syntactic nature of Classical NR, CP (2014) appealed not only to Horn clauses but to the claimed properties of a variety of so-called *strict NPIs*. The idea was the now traditional one that certain NPIs require the existence of a local relation to their so-called licenser.

Relevant then are claimed contrasts like the following involving the purported strict NPI adjectival modifier *all that*. Horn cites the following paradigm from CP(2014: 85):

(33) a. Arnold is *(not) all that intelligent.

b. Lucinda doesn't believe/think that Arnold is all that intelligent.

c. *Lucinda doesn't know/realize that Arnold is all that intelligent.

For CP (2014), the negation in (33b) orginates in the embedded clause, as a sister to the strict NPI *all that* intelligent, and then raises to the matrix clause where it is realized overtly. Such NEG raising is impossible in (33c), since *know/realize* are not CNRPs.

However, Horn (2014: 192-193) rightly observes that the internet example (34) is well-formed, when the instance of *know* is *know-NF*:

(34) I don't know that it was all that easy even back then.

Further examples of strict NPIs (highlighted) in clauses embedded under negated CU-predicates are given in the following sentences:

(35) a. But she doesn't know that it's *all that* bad.

(http://crookedkat.tumbir.com/)

b. Bruschetta is quite delicious as well, but I can't say I've indulged *in ages*.

(www.realkidseatspinach.com/bruschetta-chicken/)

c. No, I can't say that I *think anything of* your post-graduate course idea.

(sebastianmarshall.com/on-the-competitive-edge-podcast)

d. I was not aware that he was *all that* annoying until... you wrote it here.

(www.sfx.co.uk › Features)

While strict NPIs are sometimes awkward or ungrammatical in clauses embedded under negated CU-predicates, they are frequently found on the internet and the present authors find all the above sentences grammatical.

Horn views the existence of such examples as problematic for CP (2014), since none of the matrix predicates in (35) is a traditional CNRP. However, we propose an analysis of these sentences parallel to the analysis of Horn clauses with CU-sentences proposed in (27) above. First, in CP (2014), strict NPIs are analyzed as negated constituents where the NEG has raised away. Consider (36a), which has the analysis in (36b):

(36) a. Lucinda is not all that intelligent.

b. Lucinda is NEG_1 [<NEG_1> all that intelligent]

For CP (2014), a parallel analysis extends to all strict NPIs, and, as we have clarified, extends in effect as well to the fronted NPI phrase in a Horn clause, as the analysis in (27) shows.

So in these terms, example (34) receives analysis (37):

(37) I do [NEG_1 know-NF] that [[<NEG_2> [it was [<NEG_3> all that easy] even back then]]

The properties of (37) are in most respects parallel to those of CU-sentences with Horn clauses. First, there are three semantically and syntactically distinct NEGs. Second, NEG_1 negates the matrix predicate. Third, NEG_2 negates the most deeply embedded clause, and NEG_3 negates the phrase *all that* easy. Fourth, NEG_2 and NEG_3 are deleted with NEG_2 having raised into the matrix clause to permit its deletion (as detailed in the appendix). As with Horn clauses, we do not show the position of the covert raised NEG_2 in (37).

From our point of view, the analyses of Horn clauses and strict NPIs in CU-sentences are parallel. Both involve a double negation structure in the complement clause with both NEGs ultimately deleted.

8. CU-Sentences and Islands

The syntactic account of Classical NR developed in CP (2014) predicts that Classical NR cases of all varieties should manifest sensitivity to clausal island boundaries. The claim is that since Classical NR is a syntactic raising phenomenon, that is, is a phenomenon of the same order as the various raisings in *wh* question clauses, relative clauses, topicalizations, etc., it is plausible that Classical NR should obey basic constraints on syntactic raising. A great deal of evidence that this is in fact the case was presented in CP(2014, especially chapters 11 and 12. The interested reader should consult those discussions to appreciate the very broad scope of the available evidence that Classical NR is sensitive to islands.

Against that background, our analysis of CU-sentences with Horn clause complements in section 6 (or strict NPIs discussed in section 7) predicts that they too should be ungrammatical when the raised NEG we posit is forced to cross a clausal island boundary.

At issue then are the sort of facts illustrated below with the traditional CNRP *believe*:

(38) a. I don't believe that they have ever made such a proposal before.

b. I don't believe that ever before have they made such a proposal.

c. That they have ever before made such a proposal, I don't believe.

d. *That ever before have they made such a proposal, I don't believe.

CP (2014) argues that the ungrammaticality of Horn clause cases like (38d) is a function of the interaction of NEG raising under our syntactic view of Classical NR with the well-known fact that topicalized clauses are islands. The contrast between (38c) and (38d) was attributed to the fact that the NPI *ever* in (38c) is a weak/non-strict NPI (analyzed by CP (2014) as a binary NEG structure), which has different properties from the NPI in a Horn clause.

Strikingly then, the same pattern found with the CNRP in (38) is found with a CU-predicate like *(not) sure*:

(39) a. I am not sure that they have ever made such a proposal before.

b. I am not sure that ever before have they made such a proposal.

c. That they have ever before made such a proposal, I am not sure of.

d. *That ever before have they made such a proposal, I am not sure of.

CU-sentences are also constrained by the island formed by the complement of *the fact*:

(40) a. I cannot swear that they interrogated her thoroughly at any time.

b. I cannot swear that at any time did they interrogate her thoroughly.

c. I cannot swear to the fact that they interrogated her thoroughly at any time.

d. *I cannot swear to the fact that at any time did they interrogate her thoroughly.

Here the non-Horn clause case (40a), the Horn clause case (40b) with no island and the non-Horn clause case (40c) with an island are well-formed. But (40d) with the island and a Horn clause is not possible.

To briefly clarify our general point of view as to the relation between islands and Horn clauses, focus on (40d). Why is this ungrammatical, as opposed to (40b) which is fine? We take this to depend on the fact that in the former case but not the latter the Horn clause is separated from the main clause by an island boundary, that associated with the complement of *the fact*. Given that, under the view that Horn clauses require syntactic raising of a NEG from the complement clause into the containing main clause, the NEG raising in (40d) but not that in (40b) must cross the island boundary, leading to the ungrammaticality.

Another island type is represented by pseudoclefted constituents. Expectedly then, one finds the following contrast:

(41) a. What I am not sure of is that she ever before contacted her cousin.

b. *What I am not sure of is that ever before did she contact her cousin.

As noted in section 7, strict NPIs receive an analysis parallel to the fronted NPI phrase of a Horn clause. Therefore, we predict that a strict NPI in the complement of a negated CU-predicate should also be sensitive to island boundaries. Consider the following examples involving strict NPIs like *in days/in weeks/in years*:

(42) a. I can't say that I've cooked such an expensive steak in weeks.

b. I can't swear that I have eaten such an expensive steak in years.

As expected then under a view that CU-sentences involve syntactic NEG raising, this kind of example is also sensitive to islands:

(43) a. *I can't say that such an expensive steak, I have cooked in weeks.

b. *I can't swear that it is such an expensive steak that I have eaten in years.

Example (43a) illustrates a clause internal topic, which renders the embedded clause an island. Correspondingly, the strict NPI is not allowed. Case (43b) illustrates an embedded cleft, which is also an island.

Summarizing briefly, our complex syntactic Classical NR analysis of CU-sentences in section 6 not only accounts for the basic facts about CU-sentences and Horn clauses, it accounts for the sensitivity of Horn clauses and strict NPIs in CU-sentences to island boundaries. Notably, Horn's nonsyntactic proposal in (13) of section 4 offers no grounds for the ungrammaticality of island cases.

9. Negative Parentheticals

CP(2014: chapter 17) expanded upon ground-breaking observations in Ross (1973) to build an additional argument for a syntactic view of Classical NR on the basis of negative parentheticals like those highlighted in (44):

(44) a. The council is not, *Ted doesn't believe*, prepared to support that proposal.

b. The council is not, *no one believes*, prepared to support that proposal.

As Ross observed, examples like (44) depend on the possibility for the main verb of the parenthetical, here *believe(s)*, to be a CNRP. Cases like (45) with non-CNRP parenthetical verbs are ill-formed:

(45) a. *The council is not, Ted doesn't realize, prepared to support that proposal.

b. *The council is not, no one dreams, prepared to support that proposal.

. Given these considerations, one might a priori expect that CU-predicates would permit negative parentheticals parallel to those in (44). But Horn (personal communication of April 19,

2014 to PMP) insightfully observes that this is not the case:

(46) a. I don't know/can't say that the council is prepared to support that proposal.

b. *The council is not, *I don't know/can't say*, prepared to support that proposal.

The state of affairs illustrated in (46b) for *know-NF* and *can't say* is general across the class of CU-predicates: CU-sentences never permit corresponding negative parenthetical clauses.

Given the treatment of negative parentheticals in CP(2014: chapter 17), the simple Classical NR analysis treated in section 5 and arguably assumed by Horn (2014) to be *the* Classical NR analysis does indeed *wrongly* predict that examples like (46b) should be grammatical (exactly as the Classical NR examples in (44) are grammatical). And that is a strong additional reason to reject the simplest analysis of section 5.

But an entirely distinct issue is how the more complex Classical NR analysis developed in section 6 fares. And, happily from the viewpoint of the current account, the complex analysis rightly predicts cases like (46b) to be ill-formed. A full technical justification of this claim is not possible here as it would require repeating much of the development of chapter 17 of CP (2014). So we abbreviate heavily.

Consider first the basic structure of a parenthetical clause. We assume such involve deletion, as specified in (47):

(47) CP(2014: 191)

> "We will assume that the parenthetical is a reduction of a full clausal structure involving a complement clause that is covert in the parenthetical itself...so a parenthetical like (3a) is taken to realize an underlying structure of the form (3b)."

The (3a, b) mentioned in (47) were:

(48) a. Sally will, Eugene assumes, take a morning flight.

b. [Sally will take a morning flight] *[LINK [Eugene assumes that Sally will take a morning flight]*]

In structure (48b), the embedded clause *that Sally will take a morning flight* is deleted. This yields the parenthetical. We explicated the account further as follows:

(49) CP(2014: 192)

"Hereafter, we refer to the italicized structure [in (48b)] as an afterthought. Parenthetical constructions are then taken to have the general underlying form in (4):

(4) [$_{A}$ X] + Afterthought (= [LINK [$_{B}$ Y[$_{C}$ Z]]])

We will refer to the clause A, that is, the clause modified by the parenthetical, as the *prime*...; to clause B as the *secondary*; and to clause C as the *tertiary*. The idea of the LINK constituent is that it expresses whatever the precise relation between the prime and the afterthought is."

So example (48a) is analyzed as:

(50) [$_{\text{PRIMARY}}$ Sally will take a morning flight] [LINK

[$_{\text{SECONDARY}}$ Eugene assumes that [$_{\text{TERTIARY}}$ Sally will take a morning flight]]]

A further key idea of the analysis in CP (2014) is that the primary modified by a parenthetical clause P is identical to the tertiary of P. Then, the tertiary of the parenthetical is deleted.

A fundamental element of chapter 17 of CP (2014) is a principle, called there (p. 197) *the Parenthetical Non-decreasingness Condition*. This requires the combination of all the elements of origin in the upper part of the secondary (e.g., modifiers, negation, the verb itself), to define a *non-decreasing* function with respect to the parenthetical's (covert) complement clause (the tertiary required independently to be identical in the relevant sense to the clause the parenthetical 'modifies').

This principle is motivated by contrasts like those in (51) and (52):

(51) a. *Terry is not, *Jack/everyone/a friend of hers denies*, a top level worker.

b. Terry is not, *no one denies*, a top level worker.

c. Terry is not, *Sandra didn't deny*, a top level worker.

(52) a. *Mercury is not, those women/most authorities doubt, too cool to vacation on.

b. Mercury is not, none of them doubt, too cool to vacation on.

c. Mercury is not, I don't doubt, too cool to vacation on.

In cases like (51a) and (52a), the unmodified negative verbs create a decreasing context. But when the negative verbs are modified by negation or there is a negative subject, the context is then nondecreasing and the examples are acceptable.

However, as noted in CP(2014: 244-245, n. 6) there is a serious issue here with the definition of *non-decreasing* as revealed by a putative inference like the following:

(53) a. Napoleon Bonaparte doubted that his mistress had consumed a sweetened drink.

b. Pepsi is a sweetened drink.

c. Therefore, Napoleon Bonaparte doubted that his mistress had consumed Pepsi.

If the verb *doubt* literally defined a decreasing function with respect to its complement, (53) would be valid. But conclusion (53c) clearly does not follow from the conjunction of (53a,b) as there is no way, barring time machines, that Napoleon could have known anything about Pepsi.

Nonetheless, *doubt* arguably does have a decreasing aspect seen in the fact that the inference of (53c) is valid *if* one replaces (53b) by assumption (54):

(54) Napoleon Bonaparte believed that Pepsi is a sweetened drink.

Let us call statements like 'Pepsi is a sweetened drink' in arguments like (53) *a subset premise*. So our claim is that *doubt* is downward entailing with respect to its complement clause when all

the relevant subset premises are true in the belief worlds of the logical subject of the propositional attitude. Where the subset premise in (53b) fails to justify the decreasingness claim, subset premise (54) does justify it. It only makes sense to claim that a verb like *doubt* is decreasing given such a condition. Hence, the Parenthetical Nondecreasingness Condition must ultimately be characterized in terms of this more complex notion of 'decreasing' limited to inferences based on appropriate subset premises. But providing a precise version of the latter is beyond the scope of this work.

Subject to the refinement just discussed though, the Parenthetical Nondecreasingness Condition rightly blocks examples like (51a) and (52a), where the negation in the parenthetical combines with the increasing verbs to yield decreasing semantics. But the addition of negative elements to the parenthetical clauses in (51b, c) and (52b, c) reverses that polarity and permits satisfaction of the Parenthetical Nondecreasingness Condition.

Briefly stated, that condition also allows negative parentheticals based on CNRPs like *Ted doesn't believe* in (48a) because the NEG they contain can be analyzed as the result of raising under a simple Classical NR analysis. The relevant clause is then underlyingly *nonnegative* and forms an increasing element. On the contrary, negative parentheticals based on non-CNRPs like *Ted doesn't realize* cannot be analyzed in terms of Classical NR. Their NEG thus functions semantically in the parenthetical clause, and serves to define a decreasing function, violating the Parenthetical Nondecreasingness Condition.

Critically then, our complex Classical NR analysis of CU-sentences represented by (27) above posits an original (nonraised) NEG in the CU-predicate clause. That means the clause defines a decreasing function in the sense defined above, so examples like (46b) violate the Parenthetical Nondecreasingness Condition for exactly the reasons (51a) and (52a) do. It turns

out then that Horn's observation about the interaction of CU-predicates and parentheticals only provides an argument against the simple Classical NR analysis of CU-sentences, the analysis we rejected. But that observation does not conflict with the complex analysis we advocate since the latter combines with the treatment of parentheticals in CP(2014: chapter 17) to correctly predict facts like (46b).

10. The Verb *doubt* and Horn Clauses

Horn clauses occur under the verb *doubt* unaccompanied by any overt instance of NEG. This is documented by google-supplied examples such as:

(55) a. I doubt that at any time did a dragonfly think tank get together and decide that the species needed to fly faster, change colors or become smaller.
(catbirdscout.blogspot.com/.../life-without-error....)

b. Yes his actions were incredibly stupid but I doubt that at any time did he think a single punch would result in someone's death.
(forums.scottishfootballforums.co.uk/.../14179-f...)

c. I doubt that under any circumstances would we let our defenses down in that regard.
(brookelorren.com/blog/page/53/)

The complex analysis of CU-sentences we have advanced leads to a simple account of such Horn clauses parallel to the account of Horn clauses for CU-sentences. In our view, *doubt* is a negative verb in the same sense as *deny*, *refuse*, *reject*, etc. It represents a decreasing and in fact antiadditive function with respect to its complement clause in the same restricted sense (involving belief worlds) discussed in the previous section. We need take no position on whether its negative property is purely semantic or represents the force of a covert instance of NEG.

Turn then to a Horn clause case like the following:

(56) a. I doubt that in any real sense at all did Lucy consider dating Greg.

b. I doubt that [<NEG_1> [[$_{PP}$ in [<NEG_2> SOME sense at all]] did Lucy consider dating Greg]]

We propose that this has a structure representable as (56b). This is almost entirely parallel to our proposed analysis of the CU-sentence (27). It differs only in that where the former has an explicit NEG in the main clause, (56a) has the negative verb *doubt*. Just as in (27), there are two NEGs in the embedded clause (which cancel semantically), one of which modifies the embedded clause and the other of which modifies SOME. Parallel to the structure in (27), NEG_1 undergoes Classical NR into the matrix clause; the relevant landing site in the main clause is not relevant to our present concerns.

A virtue of analysis (56b) is that it correctly predicts that strict NPIs, such as those highlighted in (57), can occur in the complement clauses of *doubt*:

(57) a. Roger: Your report doesn't surprise me as I doubt that area has been surveyed in years, (http://cruisersnet.net/alert-region/035-ef-nav-alerts/?sort=geo)

b. Without makeup, I doubt she's *all that* nice to look at on the outside. (http://www.thetruthaboutguns.com/2014/09/robert-farago/shannon-watts-stops-making-sense/)

Another virtue of the analysis in (56b) is that via the logic of the previous section, it correctly predicts that *doubt* clauses have no simple parenthetical correspondents, but do have one when one negative element appears in the parenthetical clause. This is correct:

(58) a. I doubt that Lois has children.

b. *Lois does not, I doubt, have children.

c. Lois does not, I don't doubt, have children.

d. Lois does not, no one doubts, have children.

e. *Lois does not, no one doesn't doubt, have children.

Example (58e) is ill-formed because the negations in the pair {not, no one} cancel, leaving the clause with the same illicit (decreasing) polarity as that in (58b).

11. Negative DPs in CU-Sentences

Horn's condition (13) purports to provide a general condition which a complement clause must meet to be a Horn clause or to contain a strict NPI licensed from a higher clause. However, condition (13) cannot achieve this goal because, other limitations aside, it has been designed much too narrowly. Specifically, it is only concerned with that subset of cases where the main clause manifests a post-Auxiliary NEG:

(59) a. I don't think that at any time was she interested in Greek poetry.

b. I can't say that at any time was she interested in Greek poetry.

Horn's (13) talks about '**a** being in a **NEG-F** relation to **p** and **a** being in an **F′** relation to **¬p**, where **F′** = **F** or **F′** < **F** on a relevant scale.' The Horn clause examples (59) can be taken as models of this statement. Case (59a) involves a CNRP, while (59b) involves a CU-predicate.

But as Horn (1978:170-171) long ago pointed out, the Classical NR phenomenon is found in more complex cases involving main clause negative DPs. That point is stressed again in Horn and Bayer (1984: 401). All of chapter 16 of CP (2014) is devoted to this topic. For example, in CP (2014), (60a), involving the strict NPI *jackshit*, was analyzed as in (60b):

(60) a. No professor believes that Mike knows jackshit about physics.

b. [NEG_1 SOME professor] [<NEG_2> believes] that Mike knows [[<NEG_3> SOME]

jackshit] about physics]

c. Every professor believes that Mike does not know jackshit about physics.

One virtue of this analysis is that structure (60b) is easily shown to correctly determine that (60a) is equivalent semantically to (60c). Moreover, this is accomplished with no appeal to a grammatical analysis of *no professor* in terms of *every professor* or conversely. In other words, unlike past accounts such as that of Seuren (1974: 195-199), we need not assume that negation can incorporate into a universal quantifier to form a negative quantifier.

The same reasoning based on analysis (61b) for the Horn clause case (61a) determines that the latter is equivalent semantically to (61c):

(61) a. No professor believes that at any time did he cheat on an exam.

b. [NEG_1 SOME professor] [<NEG_2> believes] that [[NEG_3 at any time] did he cheat on an exam]

c. Every professor believes that at no time did he cheat on an exam.

Horn's condition (13) fails to describe cases like (60a) and (61a). The most obvious reason for that failure is that Horn's condition references an *overt* syntactic NEG preceding the main clause predicate, where cases like (60a) and (61a) manifest no such NEG. Because of the positioning of the subject variable *a* preceding the NEG in (13), it is impossible to give some interpretation of the condition in which the NEG referred to is the negation found in the expression *no professor*.

An equally serious limitation of Horn's (13) with respect to (61a) involves the equivalence to (60c). The problem is that there is no way to take (61a), repeated as (62b), to be a model of the statement in (62a):

(62) a. '**a** being in a **NEG-F** relation to **p** and **a** being in an **F′** relation to **¬p**, where **F′** = **F** or

F′ < **F** on a relevant scale.'

b. No professor believes that at any time did he cheat on an exam.

c. No professor believes that at no time did he cheat on an exam.

To satisfy (62a), the subject of (62b), *no professor*, must instantiate the first occurrence of variable *a* and then must also satisfy the second occurrence. But that would require *no professor* to stand in an equivalent or weaker relation to the negation of the complement clause on a relevant scale, equivalent to (62c). But what is wanted is not that but something capturing the equivalence between (61a) and (61c).

We are unable to see how this lacuna could be filled by any simple modification or generalization modifying (13). For the simpler cases Horn's (13) was intended to cover, the subjects in the related sentences are identical. But in those like (61a) the related sentences need distinct quantifier phrases.

In short, since Horn's (13) cannot cover cases with quantified subjects and since such cases can take Horn clause and strict NPI complements, the offered condition is too weak to represent an account of the overall phenomena. In section 12, we argue that Horn's condition in (13) is also too strong, since it erroneously blocks quasi-Horn clauses.

Perhaps the reason that Horn's proposal in (13) ignores the class of phenomena represented by cases like (60) and (61) is that, somewhat surprisingly, analogs of these arguably do not exist with CU-predicates. Unlike the situation with Classical NR cases based on traditionally cited CNRPs, CU-sentences with Horn clause complements or complements containing strict NPIs licensed from the main clause always seem to involve a post-Auxiliary NEG in the main clause. This is documented in (63), where (63b), for instance, illustrates that there is no analog of (62a) based on a CU-predicate:

(63) a. No professor is certain that Veronica has withdrawn from the university.

b. *No professor is certain that at any time did Veronica reveal her convoluted plans.

c. No professor believes that at any time did Veronica reveal her convoluted plans.

Example (63b) illustrates that if the CU-predicate takes a negative DP subject, no Horn clause is possible. In this, CU-sentences contrast with Classical NR sentences based on CNRPs, as shown in (63c).

At least one hedge is required here, however. It may be that for some speakers some cases like (63b) are grammatical under a quasi-Horn clause analysis. See section 12 for further discussion.

12. Quasi-Horn Clauses

CP(2014: 14.5, 16.5) was led to distinguish Horn clauses from a class of clauses which at first glance are easily taken to be Horn clauses functioning as the complements of *non*-CNRPs. Compare the Horn clause in (64b), based on the CNRP *think*, with what we called a *quasi-Horn clause* in (65b), based on the non-CNRP *claim*:

(64) a. I do not think that Evelyn has successfully trained any cheetahs.

b. I do not think that any cheetahs has Evelyn successfully trained.

(65) a. I did not claim that Evelyn has successfully trained any cheetahs.

b. I did not claim that any cheetahs has Evelyn successfully trained.

The grammaticality of cases like (65b) at first glance threatens the view originally due to Horn (1975:283; 1978: 169) and taken as axiomatic in CP (2014) that Horn clauses both depend on Classical NR and support a syntactic view of that phenomenon. But CP (2014, chapters 14 and

16) argued to the contrary, claiming that complement clauses like that in (65b) are not Horn clauses but a related type of clause.

A key difference between (64b) and (65b) is that the former entails (66a), but the latter does not entail (66b):

(66) a. I think that no cheetahs has Evelyn successfully trained.

b. I claimed that no cheetahs has Evelyn successfully trained.

This suggests that despite appearances, quasi-Horn clauses are not Horn clauses. CP (2014) argue that in (65b), *any cheetahs* takes matrix scope, so that that example means:

(67) For no cheetahs x, I claim that Evelyn had successfully trained x.

The more general idea was that a quasi-Horn clause is characterized by the property that the quantifier phrase extracted by Negative Inversion in the complement clause takes main clause scope, whereas in a Horn clause, in contrast, the parallel phrase takes complement-internal scope.

Quasi-Horn clauses appear on the Web. These include (68a,b), which we find acceptable:

(68) a. The radical scholars, apart from Murdock, do not propose that at any point did Christianity, even though it meant many things in practice, come into being as part of a deliberate conspiracy.
(http://www.examiner.com/article/d-m-murdock-s-christ-conspiracy-no-grounds-for-irreconcilable-differences)

b. It does not say that at any point did she consult her parents or any other adult.
(http://www.patheos.com/blogs/friendlyatheist/2009/07/02/tarot-cards-tricked-them/)

We observe that quasi-Horn clauses in general represent an even worse problem for Horn's (2014) condition (13) than that noted in section 11 (namely, its failure to cover cases with

negative DP subjects). Whereas the former flaw merely involved facts the condition failed to describe, the facts about quasi-Horn clauses represent actual counterexamples.

Consider again (65b). According to Horn's condition (13), this should imply that I claimed (or perhaps thought) that Evelyn has not successfully trained any cheetahs. But there is no such implication, since (65b) could be true if I never made any claims at all about cheetah training, and furthermore, had no thoughts about whether or not Evelyn successfully trained cheetahs. Therefore, Horn's (13) wrongly blocks legitimate quasi-Horn clause examples.

13. The Scope of Classical NR

The extended argument for a syntactic view of Classical NR in CP (2014) did not pretend to supply anything like a full account of this phenomenon. One particular open question concerns the class of main clause predicates which permit the raising in question. CP (2014) listed a large collection of these, which, as indicated at the outset, we called *Classical NEG Raising Predicates* (CNRPs). We have retained this label in the present work for those predicates, even though we have shown that Classical NR also applies with CU-predicates. But we made no attempt to give any semantic characterization of this class beyond such a listing.

A laudable attempt at providing a principled account of membership in the CNRP class was though made in Horn (1978). He argued that a necessary condition on membership was occurrence in a medial position on certain deontic and epistemic semantic scales. While categorizing a great deal of data, this idea unfortunately suffers from clear counterexamples. For example, the French verb *falloir* 'necessary, must' is, as Horn (1978: 202) recognized, an uncontroversial CNRP, but lies at the strong end of the scale *possible* < *likely* < *necessary*, not in its middle region We have nothing to offer to go beyond the sheer listing of CNRPs in CP

(2014).

The same question arises for CU-predicates. An initial possible characterization of the class might be given as follows. A predicate R is a CU-predicate only if (a) the logical subject of *unnegated* R is committed to the truth of the complement of R, and (b) the logical subject of [NEG R] is not committed to the truth of the complement of R.

Such an account excludes factive predicates, since a factive predicate, whether negated or not, presupposes (and hence entails) the truth of its complement. This would determine why factive *know* is not a CU-predicate. The account also excludes weaker predicates like *likely*, *possible*, which involve no commitment to the truth of the complement.

As we have seen, *certain* is a CU-predicate. Consider then:

(69) a. I am certain that Harry never dated Marilyn.

b. I am not certain that Harry never dated Marilyn.

Example (69a) commits the speaker to the truth of the complement proposition, as shown by the anomaly of adding to (69a) something like *but he probably did*. Since, however, the negation in (69b) eliminates the commitment, addition of the same follow on (*but he probably did*) to (69b) is perfectly fine.

Even if the semantic characterization of CU-predicates we have advanced above proves to be viable, fundamental mysteries remain. In particular, why is Classical NR possible with CU-predicates and with traditional CNRPs but not with arbitrary complement-taking predicates? And why with traditional CNRPs is Classical NR possible in the case of main clause negative DPs but not possible with CU-predicates in the same case? We have no answers at this point.

14. Conclusion

Horn (2014) has assembled an array of important new data relevant to the understanding of the Classical NR phenomenon. Our response has argued several major points. First, nothing in that body of data is incompatible with the syntactic view of Classical NR in CP (2014). Second, Horn's own proposal, (13), intended as an alternative to our syntactic view, fails to capture the fact that Horn clauses are instances of Negative Inversion.

Further, Horn's new treatment in (13) of Horn clauses suffers from various other problems. It fails to account for their sensitivity to island constraints and is not general enough to account for Horn clauses embedded under CNRPs with negative DP subjects. Furthermore, Horn's (13) erroneously predicts quasi-Horn clauses to be ungrammatical. Lastly, we have suggested that the claim in (13) that there is a think-not implication is not correct.

Far from disconfirming the analysis of Classical NR in CP (2014), the syntax of CU-predicates supports many of the basic assumptions of that work, including the analysis of NPIs as negative phrases and the existence of NEG deletion.

Appendix: Some Technical Underpinnings of the Previous Discussion

The posit of multiple covert NEG structures like those in (27) above raises various questions. We can here only touch on these very lightly. This appendix addresses some of these issues, by presenting relevant technical assumptions from CP (2014).

Consider our basic analysis, repeated from (27) above:

(70) I NEG_1 know that [<NEG_2> [[[<NEG_3> ever] before] have the media played such **a** major role]]

Recall that in section 6 we justified the assumption that NEG_2 raises into the matrix clause, a feature not represented in (70). To provide a still broader justification of our approach,

we need the following: (a) an account of the nature of NEG deletion, and the possible syntactic configurations where it occurs. (b) a principle motivating Classical NR in such examples. (c) principles that prevent overgeneration of NEG deletion structures.

CP(2014, chapters 7 and 8) propose the general view that NEG deletion is based on a primitive binary relation between phrases called *NEG Deletion (NDEL)*, notated as in (71a) and interpreted as in (71b):

(71) a. NDEL(X, Y), where Y=NEG.

b. The NDEL Interpretation Condition

If NDEL(X,Y), then Y = NEG and Y is not pronounced.

Phrases instantiating the variable X in (71a) are called *NEG deleters*. A fuller representation of structure (70) would indicate that the NEG deleter of NEG_2 is the negated matrix verb [NEG_1 know], while the NEG deleter of NEG_3 is NEG_2. These deletions form an object called a *NEG Deletion Chain*, a sequence of phrases meeting various conditions. For (70), the NEG deletion chain would be (72):

(72) <[NEG_1 know], NEG_2, NEG_3>

The basic idea is that NDEL(X,Y) holds between each successive pair in a NEG deletion chain and that any deleted NEG occurs in such a chain.

Chapter 8 of CP (2014) posits a number of general conditions taken to govern NEG deletion and NEG deletion chains. The relevant conditions are gone over below. But one further principle not discussed in CP (2014) is needed. It can be briefly motivated as follows. Even though that work allows NEG to modify any syntactic constituent which can be semantically negated, we know of no cases in English (or indeed in other languages) where an overt NEG is adjoined to a clause. That is there are gaps like:

(73) a. *Not Vincent left.

b. *I think that not Vincent left.

Based on very limited knowledge, we therefore boldly suggest a general principle, to be added to the collection of principles governing NEG deletion in CP (2014), as follows:

(74) The Clausal NEG Deletion Condition

For every structure $[_{\text{Clause}}\ \text{NEG}_x\ [_{\text{Clause}}\ Y]]$, there exists a Z such that NDEL(Z, NEG_x).

If (74) is sound, it explicates why there is a sharp contrast between the surface syntax of natural languages and that specified in the propositional calculus (where a propositional symbol may combine with negation: ¬p).

To discuss the relevant principles from CP (2014), a few more general background assumptions from that work are relevant. First, CP (2014) assumed that the specifics of NEG deletion depend on a fundamental division of phrases serving as NEG deleters, that is, phrases instantiating the variable X in (70a). These were of two types. One set of idiosyncratic types are called *lexical NEG deleters*. These in general meet no conditions on their *internal* structure except being lexically marked as members of the category of lexical NEG deleters. Lexical NEG deleters are not relevant to the present discussion and hence are not mentioned further here.

The other class, called *general NEG deleters*, are claimed to be subject to a general condition which is, from one point of view, the analog in the system of CP (2014) of the various semantic conditions on *NPI licensers* posited in more currently standard approaches to NPIs. CP (2014) required, via the following condition, that general NEG deleters define nonincreasing functions.

(75) The General NEG Deletion Condition

If C = <A, NEG_1, ..., NEG_n> is a NEG deletion chain, and A is a general NEG deleter, then A defines a function which is nonincreasing with respect to the origin position of each NEG in C.

Second, just as standard views of NPIs commonly appeal to a c-command condition on NPI licensing, CP (2014) posited a c-command condition on NEG deletion:

(76) The NDEL C-Command Condition

If NDEL(X, Y) then X c-commands Y.

Another critical assumption of CP (2014) is a recognition of two general types of NEG structures, representable as:

(77) a. [NEG X], where X $\neq$ [NEG Y].

b. [NEG X], where X = [NEG Y].

The structures in (77a) were called *unary NEG structures*, those in (77b) *binary NEG structures* or *reversals*. Unary NEG structures correspond to strict and strong NPIs, and binary NEG structures correspond to non-strict and weak NPIs. The present paper need not discuss binary NEG structures. It was claimed that the deletion of unary NEGs is governed by stricter principles than those of reversal NEGs.

In particular, deletion of unary NEGs was taken to be subject to condition (78):

(78) The NDEL Clausemate Condition

If NDEL(X,Y) and Y is a unary NEG, then X and Y are clausemates.

Lastly, CP (2014) posited a condition, whose foundational idea is due to Szabolcsi (2004), which serves to rule out massive overgeneration of structures with covert NEGs. We here, however, present an oversimplified version, since the actual one involved several complex issues not relevant here.

(79) The NEG Deletion Evenness Condition

If G is a NEG Deletion Chain, then G contains an even number of NEGs.

All these principles were motivated entirely independently of CU-sentences, which, as indicated earlier, we were unaware of.

Now consider how the CU-sentence example represented in (70), taken here for illustration, satisfies the general idea that NEG deletion is a function of the NDEL relation as well as the full set of constraints above. The Clausal NEG Deletion Condition requires NEG_2 to be deleted. The General NEG Deletion Condition then requires the NEG deleter of NEG_2 to define a nonincreasing function. The only forms in the complement clause of (69) with this property other than NEG_2 itself are NEG_3 and [NEG_3 ever before]. These phrases do not, however, c-command NEG_2. Therefore, the General NEG Deletion Condition and the NDEL C-command Condition combine to entail that the NEG deleter of NEG_2 cannot be internal to the complement clause. So it must be in the main clause.

The NDEL Clausemate Condition requires that the NEG deleter of NEG_2 must be its clausemate. Therefore, NDEL(X, NEG_2) in (70) can only satisfy the overall set of conditions on NEG deletion if NEG_2 raises into the main clause. There it finds a decreasing phrase, [NEG_1 know-NF] (the matrix verb modified by negation), which is a c-commanding clausemate and hence a licit NEG deleter.

The NEG Deletion Eveness Condition blocks a large number of unwanted structures. For instance, consider (80a), which differs from (70) only in violating it:

(80) a. I NEG_1 know that [<NEG_2> [[[NEG_3 ever] before] have the media played such major role]]

b. I don't know that never before have the media played such a major role.

In this structure, only NEG_2 is deleted, leaving NEG_3 overt. The resulting interpretation would be identical to that of (70) since in the current system, NEG deletion has no semantic consequences. However, (80b) cannot have the same interpretation as (70). But that follows since in (80b), only one NEG is deleted, violating the NEG Deletion Evenness Condition. Essentially the same argument shows why a structure differing from (80) in that NEG_2 is not deleted but NEG_3 is is also ungrammatical, since it too would manifest a NEG Deletion Chain with only a single deleted NEG, and also conflict with the Clausal NEG Deletion Condition.

Given the above analysis of CU-sentences with embedded Horn clauses, one can ask if a similar analysis could be given to cases of Classical NR based on CNRPs. Consider the following analysis of a Classical NR case based on a CNRP:

(81) a. I don't believe that ever before did he perform there.

b. I [NEG_1 believe] that [<NEG_2>[[<NEG_3> ever before] did he perform there]]

This is distinct from the simpler analysis given in CP (2014), representable as (82):

(82) I [NEG_1 believe that [[<NEG_1> ever before] did he perform there]]

The difference is that in the latter analysis there is a single NEG that originates on the fronted negative phrase in the embedded clause and which ends up right adjacent to the matrix Aux. But in (81b), there are three different NEGs.

Structure (81b) appears to satisfy all the conditions on Classical NR and NEG deletion we have invoked. This raises the question of whether (82) is the unique correct analysis for a case like (81a). Even more generally, one might wonder whether the simple Classical NR analysis is ever correct and whether it might be the case that raised NEGs are always deleted as in (81b). This would be consistent with the Classical NR analysis of cases like (83a) as (83b) in CP (2014) in which, as in (81b), the raised NEG is deleted and hence covert.

(83) a. No professor believes that Mike knows jackshit about physics.

b. [NEG_1 SOME professor] [<NEG_2> believes] that Mike knows [[<NEG_3> SOME] jackshit] about physics]

But available evidence suggests that uniformly requiring raised NEGs to be deleted is not tenable. As shown in section 9, there is a clear difference between CU-predicates and traditionally recognized CNRPs in the context [AUX NEG Predicate] with respect to parentheticals. The latter but not the former can appear in negative parentheticals and this fact follows directly from the interaction of differing raising analyses we have proposed with the Parenthetical Nondecreasingness Condition. Crucially, representation (82) is required to explain these facts (the raised NEG is not interpreted in the matrix clause, and so the Parenthetical Nondecreasingness Conditon is satisfied).

However, even though (81b) cannot be the *only* analysis of sentences like (81a), we are aware of nothing that blocks it as an analysis of that type of example. So for the time being, our assumptions admit both (81b) and (82) style analyses of negated CNRP sentences. We are aware of no factually unacceptable consequences of that possibility.

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Notes

1. Horn (2014: 191) also cites the following example, which seems to be an instance of the overall CU predicate phenomenon:

(i) You can’t make me believe that he lifted a finger to help.

Note that Horn clauses are possible in this kind of example:

(ii) You can't make me believe that under any circumstances would he lie.

These examples have several possibly unique features of interest. First, (i) contains the strict NPI *lift a finger* and (ii) contains a Horn clause. Second, they seem to be idiomatic as there is no necessity that the 'you' actually seek to cause belief. Third, the subject DP is not free. Substituting *The woman on the corner* for *You* seems to seriously degrade the result. Fourth, as Horn notes, the choice of auxiliary is not free, as substitution of *shouldn't* for *can't* degrades the result. Fifth, substitution for *believe* of even a verb as close as *think* seems to yield a nonsentence. A full analysis of examples like (i, ii) is beyond the scope of this discussion.

2. Andrew Radford points out the following sentence where there is no subject Auxiliary inversion is acceptable in his British English dialect:

(i) I can't say that at any time she was interested in Greek poetry.

We find (i) impossible. Our prediction is that any dialect that accepts (i) will also accept lack of inversion with a fronted negative expression. Radford also reports the following from a radio broadcast:

(ii) By no means you would describe it as windy (John Murray, BBC Radio 5)

Radford's own judgment is that (ii) sounds odd. Clearly, much more work is needed to find out if there is a correlation in British English (and other dialects) between the possibility of the lack of inversion in sentences like (i) and (ii). If such a correlation existed, it would strongly support our theory of Horn clauses, where the NPI phrase involves covert negation.

3. Andrew Radford reports that (18b) and (19b) are acceptable for him. We have no account of this inter-speaker variation.

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