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An Experimental Study of the Differences Between "Just" and "Only": NPI Licensing and Modal Scope

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AN EXPERIMENTAL STUDY OF THE DIFFERENCES BETWEEN ‘JUST’ AND ‘ONLY’: NPI LICENSING AND MODAL SCOPE

by

TALETHA CALLAHAN-KANIK

A dissertation submitted to the Graduate Faculty in Linguistics in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

2018
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This manuscript has been read and accepted for the Graduate Faculty in Linguistics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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THE CITY UNIVERSITY OF NEW YORK
ABSTRACT

An Experimental Study of the Differences Between ‘Just’ and ‘Only’:
NPI Licensing and Modal Scope

by

Taletha Callahan-Kanik

Advisor: Dr. Janet Dean Fodor

Throughout much of the theoretical semantic literature, the two exclusives only and just have been assumed identical in their structures and semantics. This manuscript contests that assumption, using parallel examples with negative polarity items (NPIs) and modals to demonstrate the asymmetry of these exclusives. After reviewing the existing theoretical literature, I utilize these examples to inform an experimental study centering around NPIs. This experiment (influenced by Chemla, Homer, and Rothschild (2011)) employs an acceptability judgment task where participants (n=90) are asked to judge sentences containing negation, only, and just (both with and without NPIs) on a 6-point scale.

Using a mixed effects model, the findings reveal a significant main effect for version (just vs. only) and a significant effect for presence or lack of an NPI, but no significant difference between just without an NPI and only without an NPI. Together, these results strongly suggest that participants find little or no difference in acceptability of sentences with these exclusives without the presence of NPIs, but a large degree of difference in acceptability of sentences containing these same exclusives with NPIs. This supports a theory where these two exclusives are different in nature. I propose my own theory, which promotes the idea of embracing two different sets of structures and semantics, and demonstrate its benefits and shortcomings.
ACKNOWLEDGMENTS

This manuscript is a culmination of many years work across many different areas. Without my various experiences across different subfields, and the people I met through them, this dissertation would not exist in its current form. Also, without the encouragement and inspiration of many individuals, it would not exist at all.

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The CUNY Graduate Center’s Second Language Acquisition Lab originally started me on a journey of experimental work back in 2009. At the time I did not envision that my dissertation would end up as a linguistic experiment, but the experiences I had there were extremely useful in the years to come as I veered more in that direction. I would like to thank the people who I worked with there from 2009 – 2011, including Dr. Gita Martohardjono, Dr. Elaine Klein, Olga Ward, Nazik Dinçtopal Deniz, Delio Vasquez, and Lorena Hernández Ramírez for their guidance and comradeship.
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1 Introduction

The concept for this manuscript was built upon nearly a decade’s musings on the semantic contribution of the word just to a sentence. Sentences such as “Just leave me alone” and “I just like pancakes” caused some puzzlement, but ultimately it turned out that the best place to start was clearly with just’s sister word, only. In English, just and only are frequently used words that belong to the group known as “exclusives” and only has received the bulk of the research and has continued to do so (see Chapter 2).

From the early stages of my research, a surprising revelation became clear: many researchers and theorists were treating just the same as only. While it was true that in some cases just could replace only and the resulting sentences could have much the same meaning, other minimal pairs revealed clear differences in acceptability. Throughout this project, I have primarily focused on just and only’s ability to license Negative Polarity Items, or NPIs, and their scope interactions with modals. Failure to note the acceptability differences between just and only was an obvious gap in the literature and thus my focus shifted from simply examining the semantics of just to demonstrating the asymmetry between just and only and conceiving a theory to fit these discrepancies.

Prior to my dissertation, my focus had been on looking at these exclusives theoretically. During that time, my many discussions with other English speakers led me to notice differences in judgments. Thus, I chose to bring my studies into the experimental realm to determine how strong and widespread opinions were on this matter. Akin to the existence of a gap in the theoretical literature examining the differences between these exclusives, there was a gap in the experimental literature as well. I created experimental sentences (with different versions distributed across

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1 Exclusives are words that are primarily used to facilitate discourse by emphasizing certain words or phrases in a sentence. Some commonly held exclusives aside from only and just are merely, exclusively, solely, and but (archaic). (Beaver & Clark, 2008)
multiple lists) to determine how the average native English speaker judges sentences with *just* and *only* with and without NPIs.

This manuscript overviews the theoretical semantic literature on exclusives and identifies the data that led me to become convinced that *just* behaves differently than *only*. From there the discussion delves into the experimental core, crediting prior studies, describing the pilot, detailing the final experimental methodology, and reporting the results and statistical analyses. With these data in hand, we then return to theoretical semantics, within which I propose my current theory for differing structures and semantics of *only* and *just*. This analysis has some merit, but I conclude by pointing out some shortcomings of this theory and identifying areas for future research.

2 **Prior theoretical analyses of *only* and *just* and the problem of NPIs**

When it comes to *just* and *only*, most of the theoretical semantics literature is concentrated around *only*, the exclusive which many consider to be the prototypical exclusive (e.g. Beaver & Clark, 2008\(^2\)). *Just* possesses an astoundingly vast number of usages and interpretations. Even discounting the adjective *just* (meaning “fair” or “lawful”), the environments in which *just* appears and the variety of meanings it contributes to sentences are numerous\(^3\). By contrast, *only*’s behavior is much more limited. With this in mind, it is understandable that much of the literature is centered on *only*, with *just* categorized among the “other exclusives.” The consequence of this tendency, however, is that the behaviors of *only* are often easily mistaken for the behaviors of all exclusives. For example, B&C (2008) state that VP-modifying exclusives license NPIs, but they only test sentences containing the prototypical exclusive, *only*. Many of their test sentences (B&C 2008, pg.

\(^2\) Henceforth “B&C (2008)”

\(^3\) Examples of other usages of *just* outside of the scope of the current topic:

(i) Eric had *just* arrived as Sarah was leaving. (Immediacy/Proximity)
(ii) It’s *just* so difficult to find a good job. (Emphatic)
(B&C 2008, pg. 68).

The goal of this chapter is to explain how the prior literature has analyzed *only* and *just*, explore how these exclusives are similar, and illuminate how they demonstratively differ from one another in respect to their NPI licensing ability. Using minimal pair sentences, I will demonstrate how the current semantic theory is unable to account for these differences.

2.1 **Restrictive and depreciative ‘just’: the type of ‘just’ that parallels ‘only’**

There are two usages of *just* which parallel usages of *only*, called the “restrictive” and “depreciative” usages. A restrictive usage of *just* enforces a limit of some kind whereas a depreciative usage of *just* minimizes the significance of some subsequent content. In semantic theory, these are more commonly known as “non-scalar” (or “logical”) and “scalar” usages respectively. Following are examples of each of these usages, also demonstrating that both *just* and *only* have the same interpretations in these types of usages.

(1)  
   a. **Restrictive/Non-Scalar**: John couldn’t have eaten the last piece of cake because he *just/only* ate pasta tonight (and nothing else).
      
      **Interpretation**: John ate pasta tonight, he ate nothing else; therefore, he could not have eaten the last piece of cake.

---

4 There were two other categories (see footnote 2) that I also identified, but are not relevant to the rest of the analysis in this proposal. My usage categories for *just* are slightly adapted from Lee’s (1987) categories of the same word.

5 The reader should note that many sentences containing *just* can be ambiguous. For this reason, parenthetical statements have been added to many examples to avoid ambiguity.
b. **Deprecative/Scalar:** John is *just/only* a student (not a teaching assistant or teacher), so he can’t go into the teacher’s lounge.

**Interpretation:** John is a student, and he is nothing more (in regard to authority) than a student, so he cannot go into the teacher's lounge.

For both *just* and *only*, the meaning of sentences containing them crucially depends on prosodic marking. Speakers can easily change the perceived meaning of a sentence containing an exclusive by emphasizing a word or phrase, usually by pitch accent (emphasis marked here by capital letters). This is known as giving that word or phrase “prosodic prominence” (B&C, 2008):

(2) John **only** invited BETH to the movie.

(3) John **only** invited Beth to the MOVIE.

(4) John **only** INVITED Beth to the movie.

Sentences (2) – (4) contain the same words, but each sentence exhibits a different prosodic prominence, resulting in a distinct interpretation. Each sentence, however, shares one inference (known as the "prejacent")⁶: John invited Beth to the movie. The prejacent is presupposed by (i.e. a presupposition of) *only*. This can be seen by observing that the prejacent (John invited Beth to the movie), is implied by each of sentences (2) – (4) as well as their negations. For example, if (2) is changed to “John didn’t only invite BETH to the movie,” the presupposition is still “John invited Beth to the movie.” The assertion, however, is no longer “John invited Beth and no one else to the movie,” it is instead “It is not the case that John invited Beth and no one else to the movie” (the negation of the original sentence’s assertion). This demonstrates that when a sentence containing *only* is negated, the presupposition is the same, but the assertion will be negated.

---

⁶ The prejacent has played a very important role in the semantic understanding of *only* since Horn (1969).
In addition to the prejacent (which we will assume to be a presupposition, following Horn 1969, and von Fintel 1999, among others), sentences containing *only* give rise to another inference: the exclusive inference. It is standard to assume that the exclusive inference is the “assertion” of *only*. Below are (2) – (4) repeated with their presuppositions (P) and assertions (A). In the next subsection, we will be revisiting how (2), (3), and (4) have different exclusive inferences/assertions, even though they contain the exact same words.

(2)  **John only** invited BETH to the movie.

    P: John invited Beth to the movie
    A: John invited no one other than Beth to the movie

(3)  **John only** invited Beth to the MOVIE.

    P: John invited Beth to the movie
    A: John invited Beth to nothing other than the movie

(4)  **John only** INVITED Beth to the movie.

    P: John invited Beth to the movie
    A: John stood in no other relation to Beth and the movie other than invite (e.g. he didn't drive her to the movie)

The separation of the presupposition and the assertion is an important distinction. If a sentence which contains *only* is negated, the presupposition will survive and the assertion will not. In these sentences, prosodic prominence leads to different assertions. It emphasizes content for the purpose of comparing it to alternative options that are contextually salient. For example, sentence (2) can be uttered in a setting where prior discourse had not made it clear that John did not invite other context-available people to the movie (e.g. Eli, Daryl, and Lily). (2) provides the information that Beth was invited and Eli, Daryl, and Lily were not. A sentence such as (3) may be uttered in a
setting where other activities or events were lined up (e.g. a party, a dinner, and a hike) and the speaker wishes to emphasize that John invited Beth to the movie, not to any of the other events. Similarly, (4) can be spoken in a context where the speaker wants to clarify that John only engaged in inviting Beth to the movie, not some other action as well (e.g. driving her there). The prosodically prominent content in these sentences is said to be receiving “focus,” while the context-salient alternate possibilities are formally known as “alternatives.”

The same observations made for the sentences above containing *only* can be made for parallel sentences with *just*. In parallel sentences, both *just* and *only* also usually share which phrases they have the ability to emphasize, yielding the same interpretations. This can be seen in examples (5) – (7) below, which are identical to (2) – (4), except for the fact that *only* has been replaced by *just*:

(5)  John *just* invited BETH to the movie.

  P: John invited Beth to the movie
  A: John invited no one other than Beth to the movie

(6)  John *just* invited Beth to the MOVIE.

  P: John invited Beth to the movie
  A: John invited Beth to nothing other than the movie

(7)  John *just* INVITED Beth to the movie.

  P: John invited Beth to the movie
  A: John stood in no other relation to Beth and the movie other than invite (e.g. he didn’t drive her to the movie)

---

7 This interpretation of (4) is solely the non-scalar interpretation as previously discussed where \[ VP \text{ only } P \] means “P and not Q.” It could also be interpreted as depreciative (or scalar), where \[ VP \text{ only } P \] means “P and nothing stronger than P.” Until scalarity is fully discussed in Section 1.2, we will be focusing on the restrictive/scalar interpretation of *only.*
2.2 Focus association, Alternative Semantics and their application to ‘only’ and ‘just’

As previously demonstrated, a given sentence containing *only* can have multiple interpretations depending on where the prosodic prominence is placed. This makes *only* a “focus-sensitive” expression. Since prosodic marking has such important semantic consequences, the Logical Form (LF) representation of a sentence containing *only* must contain information that clearly distinguishes between the constituents that are marked for focus (known as the “focus associates”) and the constituents that are not. This “focus-marking” has both a phonological and a semantic effect. The phonological effect is the observed prosodic prominence, while the semantic effect is which alternatives are excluded.

There can only be one focus-marked phrase per focus-sensitive expression. The standard convention for the representation of focus-marking is the enclosure of the focus associate inside a set of brackets with a subscript F following it (e.g. [Beth]_F). Below are the same sentences examined in (2) – (4), repeated this time with focus-marking:

(8) John **only** invited [Beth]_F to the movie.
(9) John **only** invited Beth to the [movie]_F.
(10) John **only** [invited]_F Beth to the movie.

*Only* requires a focus-marked phrase to convey which content is being emphasized and demonstrate that alternatives exist to said content. Focus-marked phrases are always interpreted as having alternatives, while phrases that do not receive focus are interpreted as not possessing alternatives. “Alternatives” are the alternate possibilities of a focus-marked sentence which are usually understood from context. When a sentence is analyzed under a theory of alternative

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8 Even if the prosody sounds neutral, *only* must still have a semantically focused-marked phrase or else the sentence is ungrammatical.
semantics (such as Rooth 1985), these they create a complete set of all the possible alternatives to
the prejacent of a focus-marked sentence. The following demonstrates the alternatives to (8):

(11) "John only invited [Beth]F to the movie"

Prejacent: John invited Beth to the movie.

Other individuals in the context: Eli, Daryl, Lily

Alternatives:

a. John invited Eli to the movie

b. John invited Daryl to the movie

c. John invited Lily to the movie

(11a) – (11c) is the complete set of alternatives to (8). Under an alternative semantics
theory of only, a sentence’s assertion negates these alternatives. In the case of (8) and (11), only
asserts that it is not the case that John invited Eli, Daryl, or Lily to the movie (each individual
alternative is ruled out), returning the correct interpretation for the sentence: John invited Beth to
the movie and no one else in the context. For a formal account of how these alternatives are
derived and how they are utilized, we will follow Rooth (1985, 1992) in assuming two semantic
values for any given expression: an ordinary semantic value (OSV) and a focus semantic value
(FSV). The OSV for a focus-marked name (such as [Beth]F) is the individual (i.e. Beth). The FSV of a
focus-marked name is a set of context-salient alternatives (e.g. Eli, Daryl, and Lily).

(12) **Focus-marked name:** [Beth]F

**Individuals in the domain:** Eli (e), Daryl (d), Lily (l), Beth (b), John (j)

**OSV = b**

**FSV = {e, d, l}**
A constituent containing a focus-marked phrase similarly has two semantic values. For this proposal we are taking the FSV of a sentence (also later represented by C) to be a set of alternative sentences (as opposed to propositions or truth values\(^9\)):

\[(13) \quad \text{"John invited [Beth]_F to the movie"}

**Individuals in the domain:** Eli, Daryl, Lily, Beth, John

**OSV** = “John invited Beth to the movie”

\[
\text{FSV} = \{ \text{"John invited Eli to the movie"}, \text{"John invited Daryl to the movie"}, \text{"John invited Lily to the movie"} \}
\]

The OSV of the sentence “John invited [Beth]_F to the movie” is the sentence “John invited Beth to the movie.” The FSV is the set of sentences that vary in regard to the focus-marked phrase (i.e. in this case, sentences of the form “John invited x to the movie”). These are the salient alternatives in the context.

Now to return to *only*. Below, two minimal pair sentences are compared: “John only invited [Beth]_F to the movie” and “John only invited Beth to the [movie]_F.”

\[(14) \quad \textbf{Individuals in the domain:} \text{ Eli, Daryl, Lily, Beth, John}

\textbf{Activities in the domain:} \text{ hike, party, dinner, movie}

a. “John only invited [Beth]_F to the movie”

\[
\text{OSV} = \text{“John invited Beth to the movie”}
\]

\[
\text{FSV} = \text{set of sentences (C) of the form “John invited x to the movie.”}
\]

\(^9\) While traditionally, the FSV has been referred to as a “set of propositions” (Rooth 1985), referring to it instead as a “set of alternatives” is also well accepted (see Rooth 1992)
As demonstrated, Rooth's alternative semantics provide us with a way to express how (14a) is semantically different from (14b). Each sentence portrays John as possessing a different set of properties (i.e. the properties of inviting x to the movie vs. the properties of inviting Beth to y), which leads to a different FSV for each sentence. For (14a), John’s set of properties is inviting some person to the movie, whereas in (14b) his set of properties is inviting Beth to some activity.

Utilizing Rooth’s FSV, we can now write a simple formula\textsuperscript{10} for only that incorporates alternatives. Here (and throughout the rest of the paper), only is treated as a sentential operator. The following formula consists of a presupposition (the condition for being defined\textsuperscript{11}) and an assertion (if defined, the conditions for its truth). If the reader will recall from the previous section, only being composed of a presupposition and an assertion is attributed to Horn(1969)\textsuperscript{12}, and is widely accepted in the literature. We will be similarly observing it here:

\begin{equation}
\boxed{\text{[only}_C S]\wedge \text{[S]}}w = 1.
\end{equation}

\textsuperscript{10} The following formula is a slightly modified version of the formula proposed for only by von Fintel (1999).
\textsuperscript{11} “Defined” meaning it has a truth value.
\textsuperscript{12} Horn (1969) breaks only into “NP only” and “VP only,” but both of them exhibit a presupposition and assertion. He defines NP only as a two-place predicate which takes a term (within its scope) and a proposition containing that term. VP only he describes as a three-place predicate, which takes a predicate, a proposition containing that predicate, and a scale of degree.
If defined, \([\text{only}_C S]^w = 1\) iff \(\forall S' (S' \in C) \& S \nRightarrow S' \rightarrow [S']^w = 0\)^13


[Onlyc] refers to the node\(^{14}\) that is composed of only and \(C\) (the set of alternatives). When the sentential operator only is applied to a sentence \(S\) in a given world (denoted by superscript \(w\)), the semantics in (15) states that this structure (i.e. \([\text{only}_c S]^w\)) is defined only if \(S\) is true in the same world (otherwise known as it presupposes the truth of \(S\)). If defined, \([\text{only}_c S]^w\) is true if and only if for all other sentences \(S'\), if \(S'\) is a member of \(C\) (the focus semantic value of \(S\)) and it is not a logical consequence of \(S\), then \(S'\) is false. This will end up negating all the alternatives in \(C\) that are not entailed by \(S\), which results in the desired interpretation of only coupled with \(S\). Ensuring that logical consequences are not ruled out is essential to ensure that for a sentence such as “John only invited [Beth and Mary]”, the alternatives “John invited [Beth]” and John invited [Mary]” are not incorrectly ruled out, while still negating an alternative such as “John invited [Eli]”. (To see the formula in (15) applied to a simple sentence containing only, see Appendix A.)

There is one problem with this all of this, however: there is another usage of only that we have been putting aside. The formula in (15) does not properly account for the scalar usage of only. As stated before, only can be used in both a scalar and non-scalar manner. In the previous examples used to demonstrate only and its theoretical background, we have confined ourselves to non-scalar interpretations for simplicity’s sake, but only has scalar interpretations as well.

A scalar use of an exclusive creates a scale by organizing its members in order of their relative “strength” to each other. The weakness or strength of each member cannot be inferred by logical entailment, unlike a non-scalar (or logical) use, which follows standard entailment. While a

\(^{13}\) The assertion could also be written as the following:

(i) \(\text{If defined, } [\text{only}_c S]^w = 1 \text{ iff } \exists S' ([S' \in C] \& S \nRightarrow S' \& [S']^w = 0]\)

(i) is equivalent to “If defined, \([\text{only}_c S]^w = 1 \text{ iff } \forall S' (S' \in C) \& S \nRightarrow S' \rightarrow [S']^w = 0\)”

\(^{14}\) “Node” meaning a location in a binary branching syntactic structure, which is the mother of two sisters.

\(^{15}\) In (26), “\(S \nRightarrow S'\)” is taken to be interpreted the same as “\([S] \text{ is not a subset of } [S']\)”
non-scalar usage of *only* could still create a scale, the weakness or strength of each member could be derived using logical entailment (Beaver & Clark, 2008). Examples (16) and (17) demonstrate both uses:

(16) **Non-scalar:** Mary *only* met [John] at the orientation. (She met no one else.)

(17) **Scalar:** Mary *only* met an [assistant professor] at the orientation. (She didn’t meet anyone of a higher rank.)

Sentence (16) is a non-scalar usage of *only* because no non-logical scale is involved. These are the types of sentences that have previously been examined above. Example (17), however, differs. Without the parenthetical addition, (17) can be interpreted as a non-scalar usage of *only*. If interpreted in this manner, the meaning is that Mary met an assistant professor at the orientation and no one else at all. This interpretation is very similar to (16): the sentence is false if Mary met anyone else at the orientation. Specifically, the presupposition to the non-scalar interpretation of (16) is that Mary met an assistant professor at the orientation. The assertion is that Mary met no one at the orientation that was not that specific assistant professor individual.

As (17) is written, however (with the parenthetical addition), the meaning is scalar. A scale is created for this sentence. Let us suppose that the scale is composed of student > teacher’s assistant > assistant professor > tenured professor > vice president > president. The scalar interpretation of (17) is that Mary met no one at the orientation that had a higher rank than assistant professor on the aforementioned scale. Perhaps she met some other students as well as teacher’s assistants, but she didn’t meet any tenured professors, vice presidents, or presidents. Meeting a president does not logically entail meeting an assistant professor (presidents don’t have to also be assistant professors, nor must they be always accompanied by assistant professors), so a non-logical scale is required in order to make sense of the intended meaning.
The presupposition to the scalar version of (17) is that Mary met an assistant professor at the orientation (the same as the non-scalar version). The assertion, however, is different: Mary met no one at the orientation who was higher ranked on the perceived scale (she met an assistant professor and perhaps a student or students, but not any tenured professors, vice presidents, or presidents). If she had met any person who had a higher rank on the scale, then their position would have been mentioned in this sentence in conjunction with only (e.g. "Mary only met a tenured professor at the orientation"). The scalar usage negates the possibility of Mary meeting anyone higher ranked on the scale, therefore the highest rank she met must be the one mentioned in the sentence.

Now we return to the formula defined in the previous section and configure it to work for scalar interpretations. Fortunately, it’s not difficult to do so. Taking the formula in (15), if instead the formula checks whether S is less than (or equal to) S′ on a scale instead of whether S entails S′, the scalar interpretation can be derived:

\[(18)\quad \text{⟦only}_C S⟧^w \text{ is defined only if (i.e. presupposes that) } \text{⟦S⟧}^w = 1.\]

\[\text{If defined, } \text{⟦only}_C S⟧^w = 1 \text{ iff } \forall S'(S' \epsilon C) \& S \not\leq SS' \rightarrow \text{⟦S⟧}^w = 0\]

The subscript S refers to a scale which S is on. This modified formula can also be applied to non-scalar uses of only if we allow for the scale to also be a logical scale (e.g. Beth is lower on a scale than Mary and Beth).

Focus association and Alternative Semantics are as applicable to just as they are to only for all the same theoretical reasons previously addressed in this subsection. The issue, however, is that much of the prior literature has treated the formulae (scalar and non-scalar) for ⟦only S⟧ as the exact same as ⟦just S⟧ due to their frequent interchangeability. The potential flaws of applying the formulae in (15) and (18) (or similar formulae) to both exclusives will soon become apparent.
2.3 NPI licensing differences

While it’s clear that *just* shares much in common with *only* (compare (5) – (7) with (2) – (4)), I have observed a difference in their ability to license negative polarity items16 (words or phrases that are only licit under certain circumstances; henceforth, NPIs) which significantly complicates matters. When *only* appears in a position where it modifies a Verb Phrase, it has been well-documented in ability to license NPIs (von Fintel 1999, B&C 2008). For example:

(19) John *only* ever [disliked, Sally]

   *only* NPI Verb Phrase

   **Interpretation:** At any time in the past, it was not the case that John had any stronger negative feelings for Sally than dislike (e.g. hate)

   Considering the number of similarities between *just* and *only*, it would be reasonable to expect them to behave similarly in regard to their ability to license NPIs. Surprisingly, this is not the case. Below is the same sentence as in (19), except that *just* has been substituted for *only*:

(20) #John *just* ever [disliked, Sally]17

   *just* NPI Verb Phrase

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16 Some of the most common NPIs are words like *ever* or *any* (note that there is a different kind of *any*, called free-choice *any*, which is NOT an NPI). NPIs are named such because of their tendency to be licit following a negative item of some sort, such as *no, not, never, no one*, etc. As has been widely accepted, however, NPIs can appear with items that are not overtly negative (e.g. *whether, doubt, if*, etc.). Taken together (negative items and non-overtly negative items alike), these items are said to be “NPI licensers:” words or phrases that must be present in the environment for the NPI to be licit.

17 The # here means that the sentence is unacceptable, or at least does not mean the same thing as its counterpart with *only*. 
We find that we do not get the same interpretation from (20) that we observed in (19). Sentences (19) and (20) demonstrate that while *only* acts as an NPI licenser, *just* appears to be unable to do the same. This is extremely puzzling and led me to propose an experiment to reveal whether other native English speakers shared these intuitions.

3 Conceptualizing the Experiment and Running the Pilot

As previously mentioned, there exists little theoretical work on either the direct comparison of exclusives (see Coppock and Beaver 2011 and 2014 for some of their work on the topic) or specifically on *just* (see Lee 1991). There is even less experimental work on either matter (Lee 1987 is one such experiment). The combination of this gap in the literature and the fact that such a large amount of the literature either ignores the existence of *just* in favor of *only* (or states the two are the same), led me to conclude that an experiment would be the best route for determining whether English speakers really intuit these two exclusives as being different from each other. It would give me an opportunity to test the psychological reality of the judgments I had observed.

My experiment focused on the observed NPI licensing differences between *just* and *only*. I incorporated two modal/scope interaction sentences (for reasons that will become clear in Chapter 6) to gather a small amount of information regarding the relationship between the judgments of them and the judgments of the NPI + exclusive sentences with the intent to run a later experiment.

While preparing for my experiment, I knew it would need to have comparisons between sentences with an exclusive + no NPI and an exclusive + NPI. NPIs have received much more
experimental work than exclusives, meaning I could draw upon them when designing my own experiment. There was one NPI experiment in particular that facilitated in the creation of my experimental framework and stimuli: Chemla, Homer, and Rothschild (2011).

3.1 Chemla et al. (2011) – a basis for my experiment

The core of my experiment was inspired by Chemla et al. (2011) who report a series of experiments utilizing French sentences which addressed the relationship between monotonicity properties and NPIs18. As will later be discussed in depth, NPIs are generally theorized to only be licit in Downward Entailing (DE) environments. This experiment tested whether participants found NPIs to be licit only in actual DE environments or whether NPIs were judged licit in all environments that participants perceived to be DE.

This experiment (with 45 native French-speaking adults as participants) consisted of two types of items: NPI sentence pairings and monotonicity inference pairings. These sentence types were presented in two separate experiment blocks and the presentation order for these blocks randomized for each participant. While the content of some of the sentence pairings across blocks were similar (e.g. *chaque alien* appeared in multiple examples as the subject), all experiment items were unique (i.e. no sentence appeared in both blocks).

For the NPI sentence pairings, participants were given pairs of minimally different sentences presented on the same screen. The sentences, which always contained quantifiers, were identical other than the fact that the first did not have an NPI and the second did have an NPI (always presented in this order). The NPI was always the same: *le moindre* ("the least"), a word that Chemla et al. maintained to be very similar to English NPI *any*.

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18 This series of experiments was also concerned with the relationship between monotonicity properties and Scalar Implicatures, but the discussion of those sections has not been included here, since it is not relevant to the topic at hand.
Participants were asked to rate the naturalness of each sentence of the pair on a continuous scale from “weird” to “natural.” It was a continuous scale (indicated by an adjustable red line) in that it had no numbers and that participants could set the length at any point between the two extremes, “weird” and “natural.”

For the monotonicity inference pairings, the participants were given minimally different sentences where one sentence contained a phrase that denoted a set and the other sentence contained a phrase that denoted a subset of that set. An example of such a sentence pair is (61):

(22) “Chaque alien a goûté du saumon fumé.”

→ Chaque alien a goûté du saumon.

Each alien tasted smoked salmon. (subset)

→ Each alien tasted salmon. (set)

The first sentence (the premise) was always put in quotes, while the second sentence (the conclusion) appeared to the right of an arrow below the first sentence, as above. Sentences alternated whether the premise or the conclusion possessed the set or subset word. Participants were asked to make an inferential judgment on whether the conclusion followed from the premise (which would either be a case of UE or DE, depending on whether the first or second sentence
contained the subset). For this judgment they again used a continuous scale where they set the length of a red line anywhere between the two extremes of “weak” to “strong.”

Chemla et al. (2011) found NPI judgments and monotonicity judgments to be correlated, with the combination of UE and DE predicting NPI judgments with a mean correlation coefficient of .458. The UE/DE combination provided a better prediction than DE alone (.458 vs .281, p = .0012) or UE alone (.458 vs .232, p = .0004). Furthermore, they found evidence of what they call a “subjectivity approach,” such that a participant is more likely to accept an NPI in an environment that they believe to be DE, rather than in a “true” DE environment\(^{19}\), finding that intra-subject subjective monotonicity is a better predictor of NPI judgments than inter-subject subjective monotonicity. Chemla et al. computed scores for each participant which corresponded to the frequency at which the judgments of other participants led to a better predictor than the predictor obtained for that participant’s own judgments.

I chose to adapt Chemla et al.’s (2011) methodology as a basis for my own NPI experiment with several changes. My own stimuli were in English (as opposed to French) and I was concerned with negation, *only*, and *just* (as opposed to quantifiers), but like Chemla et al., I presented subjects with pairs of parallel sentences that only differed in the addition of an NPI. While Chemla et al. recruited undergraduate students and conducted their experiment in-person, I recruited participants through Amazon Mechanical Turk and conducted my experiment online using the Qualtrics surveying software. Finally, the way the participants rated the sentences differed: instead of a continuous scale, I used a fixed number scale with six different intervals numbered 1 to 6.

\(^{19}\) However, in this experiment UE environments were judged UE more than DE environments were (Chemla et al. report M=78.0% vs. M=44.3%, p < .001), and DE environments were judged DE more than UE environments were (Chemla et al. report M=69.4% vs. M=41.2%, p < .001).
3.2 The pilot: methodology and examples

Before running the full dissertation experiment, I first ran a preliminary test on non-linguists both to gauge how they felt about NPI + *only* vs. NPI + *just* sentences as well as to try out two specific variations of the experiment. This was a small informal experiment (which I call here the “pilot”) with three volunteer participants at the end of June/beginning of July 2016. All three participants were college-educated males between the ages of 25 and 35 who were not involved in the Linguistics field. The pilot was conducted through Qualtrics and the participants were given a link to it. In this section, I discuss the stimuli creation and methodology (with examples) of this preliminary experiment.

The experimental sentences were created to follow a particular format. Each item was short enough to fit on a single line when displayed to participants and neither the content nor the syntactic structure of the sentence was intended to be confusing or difficult. Rather than present each experimental item as two sentences, each experimental item was composed of two parts separated by a semicolon. These two parts were contrastive in nature.

(23) That restaurant doesn’t serve SOUP with its entrees; it serves SALAD.

The first part of the sentence was longer than the second part, as the second part was merely intended to ensure the correct focus and contrast was being made by the participant. Each part contained a word that was receiving focus (written in capital letters to make clear this emphasis). Each experimental item began with a simple determiner phrase (DP) (either a name or a short, commonly used phrase) and used either present or future tense. This was to avoid as much confusion as possible regarding various other usages of *just* (e.g. “John just drank” to mean that John very recently drank something, whereas this particular ambiguity does not occur with “John just drinks” or “John will just drink”).
The location of the exclusives and the NPIs also had to be carefully considered. While *only* is widely accepted in a phrase or sentence initial position (e.g. *Only John likes candy*), many native English speakers do not accept *just* in a similar position (e.g. *Just John likes candy*), meaning that the exclusive could never appear in this position in the examples. For the experimental items containing NPIs, these NPIs had to be placed within a PP to ensure that the NPI did not occur within the same phrase as a focused item. *Only* is theorized to only license NPIs that are not within the same scope as the focused phrase\(^{20}\) (Horn 1996, von Fintel 1999, Beaver & Clark 2008, among others), so in order to demonstrate any genuine acceptability difference between *just* and *only*, NPIs have to be placed in a potentially acceptable spot for both. The only two NPIs used in the experiment were *any* and *ever*. These two NPIs were decided upon because they are extremely common in usage. *Any* was used in sentences with an NP focus while *ever* was utilized in sentences with a VP focus. Examples of the *only* + NPI versions of each NPI are as follows:

(24) That restaurant only serves SOUP with any of its entrees; it doesn’t serve SALAD.

(25) Mary only ever TEXTS her friends on the weekends; she doesn’t CALL them.

All participants saw the same 48 sentences. These sentences were composed of 12 sets of sentences, each set containing 4 different versions. These versions were 1) a sentence containing negation and no NPI (Type A sentences) 2) the same sentence, also containing negation, with an NPI (Type B sentences), 3) the same sentence with *only* switched in for negation and an NPI (Type C sentences), and 4) the same sentence with *just* switched in for negation and an NPI (Type D sentences).

\(^{20}\) In Horn (1996) he demonstrates this elegantly by using a sentence with two NPIs: *Only young writers ever accept suggestions with any sincerity.* (C.f. with the unacceptable sentence: *Only any young writers accept suggestions with sincerity.*)
An example of one of these sets of four follows (the full set of pilot experimental items can be found in Appendix D):

(26) 1A Jonathan doesn't drink BEER at his parties; he drinks WINE.
      1B Jonathan doesn't drink BEER at any of his parties; he drinks WINE.
      1C Jonathan only drinks BEER at any of his parties; he doesn't drink WINE.
      1D Jonathan just drinks BEER at any of his parties; he doesn't drink WINE.

Half of the experimental sentence sets utilized any as their NPI (“NP + any”) with the other half utilizing ever as their NPI (“ever + VP”). There were no fillers included in the pilot. After a short tutorial session, participants judged each sentence by the following protocol: “Given a normal context, I can say this sentence.” To answer this prompt, participants were given a 6-point scale with 1 being “Absolutely Disagree” and 6 being “Absolutely Agree.”

My predictions for the pilot were the following:

(27) **Prediction 1**: Participants would generally place the Type A and Type B sentences on the high end of scale (5s or 6s)

**Prediction 2**: Participants would generally find the Type C sentences more acceptable than the Type D sentences.

**Prediction 3**: Participants would generally place Type D sentences on the low end of the scale (1s or 2s)

There were two different versions of the pilot. The first participant received an ordered version, with all versions of the same sentence set following in the same sequential order (the order being NEG + no NPI, NEG + NPI, ONLY + NPI, JUST + NPI). The second and third participants
received a randomly ordered version where the order of all sentences was randomized (items of the same set only appeared next to each other by chance). This was done to assist in deciding whether to use an ordered sentence set where items of a sentence pair were placed one after another (as Chemla et al. did) or a pseudo-randomized sentence set (as suggested might be better by one of my advisors) in my final experiment. All 48 experimental items were displayed on the same screen (while it was not physically possible for participants to see all of the sentences at the same time, they could freely scroll between them). While none of the sentence judgments were forced choice (i.e. they were permitted to skip), all pilot participants judged all items.

All three participants were also asked to participate in a follow-up written debriefing. This debriefing contained questions about how they felt concerning the individual items and regarding their thoughts on the ordered or randomized sequence (whichever corresponded to the experiment version they completed) presented to them in the pilot. Only two participants completed their briefing, one for the ordered set and one for the randomized set.

### 3.3 Results of the pilot and conclusion based on survey feedback

For the pilot, Prediction 1 was confirmed outside of some potentially problematic sentences, which will be touched on shortly. Participants generally liked the Type A and Type B sentences, usually ranking them in the 4–6 range. Prediction 3 was also confirmed. Overall, the participants did not tend to accept the Type D sentences, often ranking them 1–2. Prediction 2 was not confirmed, however. While some of the participants did rank some of the Type C sentences in the 4–6 range, the same participants ranked some other Type C sentences in the 1–3 range. What is encouraging, however, is that the participants generally rated the Type C sentences as more

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21 My thanks to Martin Chodorow
acceptable than the Type D sentences, even if their ratings of the Type C sentences were lower than I expected. Combined with the confirmation of Prediction 1 and Prediction 3, this makes me confident in pursuing this experiment on a larger scale.

After surveying the individual judgments of the pilot data, I was able to identify some possible problem sentences. Sentence sets 5, 7, and 9 seemed particularly problematic for the participants, potentially due to some sort of strangeness of the content (for example, sentence set 9 revolved around the idea of borrowing clothes from friends, which has been revealed to me as an odd concept for some individuals).

The debriefing revealed some interesting insight on how the participants felt about the ordered vs. randomized sequence of sentences. Subject A (who took the ordered sequence version) commented that despite trying to score each sentence individually, he found himself being able to predict how he was going to respond to later sentences in a set. This may have influenced his judgments in an unintended way (and, indeed, his judgments took on a fairly formulaic pattern not exhibited by the two subjects who received the randomized sequencing). When asked to imagine what it would be like if the sentences had been randomized, he said the task would have likely required more of his concentration, forcing him to read and reread each individual sentence to make sure he read it correctly and that it made sense to him.

Subject B (who took the randomized sequence version) stated that there were two or three times that he found the randomized ordering to be distracting. He mentioned scrolling back to double check that the sentence was not identical to one he had answered before. Other than that,

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22 This type of behavior certainly should not be allowed in a final experiment, and I’m glad that the subject brought this desire to my attention. It highlighted the importance of two elements: 1) that experiment items should be presented on their own screen, and 2) that the instructions should clearly explain that each sentence (regardless of its similarity to other sentences) should be judged on their own, without any comparison to other sentences.
he was comfortable with the randomized ordering, even suggesting that in a future version I might want to consider ensuring that similar items be placed a minimum distance apart.

From these two debriefings, I decided to pursue a pseudo-randomized ordering for my final experiment. The ordered sequence appeared to potentially cause issues with participants attempting to evaluate each sentence individually (perhaps even resulting in premature judgments) while the randomized ordering did not appear to be overly confusing.

The preliminary findings of the pilot were encouraging enough to pursue the experiment in full, keeping the core methodology and purpose of the experiment the same, while implementing some changes moving forward.

4 Methodology of the NPI Experiment

After running the pilot experiment, it was clear that while the core idea of the experiment was sound, the format and stimuli needed some revisions.

The heart of the experiment stayed the same: 12 experimental items were used, each with multiple versions. These experimental items maintained their general structure (one sentence divided into two parts by a semicolon) and continued to be thematically contrastive in nature. Participants were still asked to judge the acceptability of these sentences on a 6-point scale. Other parts of the experiment changed substantially from the pilot, which I’ve divided into five categories:

(28) Changes Made from Pilot to Final Experiment

a. The experimental sentences were modified; some of them were completely changed from their pre-pilot version
b. Sentence sets were larger
c. Participants saw fewer experimental items from the same sentence set (three different lists were introduced and participants were divided equally between them)

d. Filler items were introduced

e. All items (filler and experimental) were pseudo-randomized

I will now describe in detail the experimental stimuli (how they were created and how they differed from the pilot) and the implementation of the experiment.

4.1 The format of experimental sentences

While each part of the sentence still had one word focused (with the focus conveyed to the reader by using capitalized letters), only NPs were focused in the final experiment. This contrasts with the pilot where half of the experimental items had NPs focused and the other half had VPs focused. This was to maintain as much parallelism as possible between sentences where the NPI ever was added and sentences where the NPI any was added (in the pilot, ever was always accompanied by a VP focus and any was always accompanied by an NP focus).

These focused NPs were also modified. The experimental sentences each had two NPs focused, just like the pilot (the first focused NP in the first part of the sentence, before the semicolon, with the second focused NP in the second part of the sentence); however, in the final experiment, the first focused NP was selected to be exactly two syllables in length with stress on the second syllable. This NP was either a name or a noun following the determiner the. Examples include Bernard, Denise, champagne, and desserts. This was done because it was specifically suggested to me that having final stress on a two-syllable word facilitated getting the proper focus
for the sentence. This may have to do with some type of perceived ease of giving the phonological markers of emphasis (e.g. high volume, higher pitch, lengthening of the vowel) to the second syllable.

Sentences also underwent substantial change in order to avoid having the NPI ever appear directly adjacent to NEG, JUST, or ONLY. There was concern that the term only ever may either be some sort of set term (or perhaps simply read/spoken more often) compared to just ever. To combat any phrase familiarization effects, all sentences containing ever had intervening material between it and the exclusive/negation. For example:

(29) The rich couple only claim that the CHAUFFEUR ever dented their sports car; they don’t claim that the VALET did.

Finally, several specific experimental sentences were changed with the intent to make them less confusing or pragmatically strange. Sentence sets 5, 7, 9, and 11 (from the pilot) were changed to a significant degree in their content. Sentence set 4 received a very minor change (the tense was changed to present as opposed to future). (For a full list of the final version of the experimental sentence sets, see Appendix F.)

4.2 The sentence sets

In the pilot, four experimental sentences comprised a sentence set (NEG with no NPI, NEG with NPI, ONLY with NPI and JUST with NPI). In the final experiment, a full sentence set contained six sentences, divided into “A” sentences (no NPI) and “B” sentences (NPI):

(30) The six types of variations for a sentence set

a. A-NEG: The sentence with negation and no NPI

23 My thanks to Danielle Ronkos and Janet Dean Fodor (p.c.) for this suggestion.
b. A-ONLY: The sentence with ONLY and no NPI

c. A-JUST: The sentence with JUST and no NPI

d. B-NEG: The sentence with negation and an NPI (either “ever” or “any”)

e. B-ONLY: The sentence with ONLY and an NPI (either “ever” or “any”)

f. B-JUST: The sentence with JUST and an NPI (either “ever” or “any”)

(31) Examples of a full sentence set

A-NEG John doesn’t know that JEROME visited our friends in Sweden; he
knows that MARY visited them.

A-ONLY John only knows that JEROME visited our friends in Sweden; he
doesn’t know that MARY visited them.

A-JUST John just knows that JEROME visited our friends in Sweden; he
doesn’t know that MARY visited them.

B-NEG John doesn’t know that JEROME ever visited our friends in Sweden;
he knows that MARY visited them.

B-ONLY John only knows that JEROME ever visited our friends in Sweden; he
doesn’t know that MARY visited them.

B-JUST John just knows that JEROME ever visited our friends in Sweden; he
doesn’t know that MARY visited them.

These additional versions were added in order to get the full contrast between how
participants rated ONLY + no NPI vs. ONLY + NPI sentences, JUST + no NPI vs. JUST +NPI
sentences, and ONLY + NPI vs. JUST + NPI sentences. The NEG sentences were there to act as a type
of control, since all participants were expected to rate both NEG + no NPI and NEG + NPI sentences high on the scale.

Rather than each participant seeing all six variations of a sentence set, they only saw one pairing of each sentence, consisting of the matching A and B sentences. For example, Participant X only saw the A-NEG and B-NEG pairing of one of the 12 experimental sentences while Participant Y only saw the A-ONLY and B-ONLY pairing of the same experimental sentence. Which pairing a participant saw was determined through the creation of three different lists. These lists contained exactly one pairing of each experimental item and were composed of 4 NEG pairings, 4 ONLY pairings, and 4 JUST pairings. Across all lists, an equal number of participants saw each pairing across sentence sets. (See Appendix I for a complete “List Composition,” which details the specific sentence set versions found in each list.)

4.3 The fillers
Since the participants of the pilot were unpaid volunteers who participated purely as a personal favor, that experiment contained only experimental items in order to keep the task as short as possible. The final experiment contained filler items due to their importance in preventing participants’ desensitization to the particular words or items under study (in this case, the words only, just, any and ever).

Because the experimental items were arranged in pairs, most of the fillers were also arranged into pairs. A total of 21 filler pairs (meaning 42 individual sentences), each falling into one of three different categories, were created for the final experiment. Another 13 fillers (not arranged in pairs) were created in a fourth category, resulting in a total of 55 filler sentences. Each
participant saw 54 of these filler sentences, a number that was chosen to allow for 48 fillers (double the number of experimental sentences) plus 3 additional warm-up fillers and another 3 additional fillers at the very end of the task. All fillers followed the format of the experimental sentences in the following ways:

(32) a. Each sentence contained two parts separated by a semicolon
b. Each sentence had a thematically contrastive nature
c. The contrasting words in the two parts of the sentence were capitalized

First, let us discuss the 42 fillers arranged into sentence sets. These filler sets only had two versions (as opposed to the six found for experimental sets): the “A” version (absence of a particular word or phrase in the first part of the sentence) and the “B” version (presence of a particular word or phrase in the first part of the sentence). Just as in the experimental B versions, the inserted word/phrase was purposefully not placed adjacent to the focused phrase. The particular word or phrase that was inserted was directly dependent on the filler category the filler came from. The three filler set categories are outlined below in (5) – (7) and are each accompanied with an example sentence pair:

(33) Modifier on an NP

Either the word last or next was inserted next to an NP in the B version of the filler sentence

Example:

F2A The tech representative tells me that JULIA worked night shifts this week; he didn’t tell me that HARVEY did, too.

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24 The discrepancy between 55 created sentences and 54 witnessed sentences is addressed shortly.
25 The bold text in the example sentences for filler set categories (5) – (7) are to facilitate the reader in locating the inserted word; they were not bolded when presented to participants.
F2B  The tech representative tells me that JULIA worked night shifts this last week; he didn’t tell me that HARVEY did, too.

(34) **Modifier on a VP**

Adverbs were inserted to modify a VP in the B version of the filler sentence

*Example:*

F11A  The child is upset that ALPHONSE sipped her apple juice; she isn’t upset that WALLACE did.

F11B  The child is upset that ALPHONSE *rudely* sipped her apple juice; she isn’t upset that WALLACE did.

(35) **Contrastive (without negation)**

These sentences were designed to be thematically contrastive in nature without using negation; the words/phrases used to modify the B versions conveyed some kind of degree: *really, kind of, a little*

*Example:*

F21A  Gilbert brags that his GRANDMOTHER excels at cribbage; Felicity brags that her HUSBAND does.

F21B  * Gilbert brags that his GRANDMOTHER excels **really** at cribbage; Felicity brags that her HUSBAND does.

Now let us return to the fourth filler category: the fillers that were not presented in pairs. These 13 fillers were categorized as “Short Story fillers” because they were all prefaced with an indicated “Situation.” Each of them also contained a modal (either *may, must, should, or could.*
These fillers differed from both the experimental sentence sets and filler sets in order to
test a secondary prediction. When I conceived this experiment, I posited that the differing NPI-
licensing behaviors of *just* and *only* are directly related to their differing modal/scope interactions
(full discussion to follow in Chapter 6). In the same way as *just* fails to license NPIs, certain
interpretations (i.e. the inverse scope interpretation, which directly contrasts with the surface
interpretation) of *just* when combined with modals like *may* appear to be blocked. If these two
phenomena are linked, we would expect an individual to have a more or less equal tolerance for
*just* licensing NPIs and the inverse scope interpretation of *just + may* sentences.

In order to gain some insight into this relationship (for a potential future experiment), three
modal/scope fillers were created which each contained the modal *may*. To assist the reader in
getting the desired interpretation, some sort of context had to be provided; thus, the “Situation”
was created to preface the sentence, leading to the name “Short Story filler.” Three Short Story
fillers (all containing the modal *may*) had two versions: a *just* version and an *only* version. For ease
of reference, let us call these special fillers “exclusive fillers.” These versions only differed in which
of these two words were used (unlike the NPI examples, there was no NEG version) and they were
prefaced with the exact same situation. The situation was created to only be felicitous with an *only
+ may* sentence by the theory outlined in Chapter 1. As with all the other sentences, participants
were asked to judge the sentence on a 1-6 point scale in terms of acceptability and truthfulness. All
three exclusive fillers, with both *just* and *only* versions, can be found in (36)-(38):

(36)    FIL22 (13: may_Pizza)

**Situation:** Nick is a 10-year-old kid who aced his math exam in school today. His mother will
order him a pizza tonight to celebrate. Nick asks if they can also order some breadsticks, but
his mother thinks this is too much unhealthy food.
Is the following a sentence that is both acceptable and true, given this situation?
(Note: participants only saw one of the following two options, dependent on list)

13-ONLY  Nick may only eat PIZZA for dinner tonight; he may not have BREADSTICKS as well.
13-JUST   Nick may just eat PIZZA for dinner tonight; he may not have BREADSTICKS as well.

(37)  FIL23 (14: may_Van)

**Situation**: James is a teenager who recently got his driver’s license. He doesn’t have his own car, but his family owns three vehicles: a van, a sports car, and a truck. Since James is a new driver, his parents stipulate that he is limited to driving the van when he drives around town alone.

Is the following a sentence that is both acceptable and true, given this situation?
(Note: participants will only see one of the following two options, dependent on list)

14-ONLY  James may only drive the VAN without his parents; he may not drive the SPORTS CAR.
14-JUST   James may just drive the VAN without his parents; he may not drive the SPORTS CAR.

(38)  FIL24 (15: may_Honors)

**Situation**: Belinda is a student in the honors program at her high school. To ensure fair treatment of all the honors students, since honors courses are in high demand, the school enforces a limit of one honors course per student each semester. Belinda chooses Honors History as her one honors course.
Is the following a sentence that is both acceptable and true, given this situation?

(Note: participants will only see one of the following two options, dependent on list)

15-ONLY  Belinda may only take honors HISTORY this semester; she may not take honors PHYSICS.

15-JUST   Belinda may just take honors HISTORY this semester; she may not take honors PHYSICS.

Unlike with sentence sets, each list had only one version of each exclusive filler (there were only two versions in total: the *only* version and the *just* version). Each list contained one *just* exclusive filler and one *only* exclusive filler. List A contained 13-ONLY and 14-JUST, List B contained 13-JUST and 15-ONLY, and List C contained 14-ONLY and 15-JUST. Distributing them this way ensured that each exclusive filler version was seen and judged an equal number of times. This is why 55 filler sentences were created, but each list only contained 54 filler sentences.

The remaining Short Story fillers were sentences following the usual filler structure and containing one of three other modals: *must* (3 Short Story fillers), *should* (3 Short Story Fillers), or *can* (4 Short Story fillers). Many contained words that were inserted in some of the filler sentence sets (e.g. adverbs) so a savvy reader wouldn’t draw a link between the sentences with NPIs and exclusives and the exclusive fillers. They were also each preceded by a Situation, but unlike the exclusive fillers, they only had one version. The sentences following the Situations differed in their degree of truthfulness. Some of them logically followed from the Situation while others directly contradicted it. An example of one of these Short Story fillers (one that directly contracts the Situation) can be seen in (39):
Situation: Lewis dropped some clothes off at the dry cleaners yesterday. When he was asked whether he could come and pick them up the next day, he told them that he was too busy, but could pick them up the day after.

Is the following a sentence that is both acceptable and true, given this situation?

# Lewis can pick up the clothes from the dry cleaners TODAY; he can’t do it TOMORROW.

All participants saw the same 52 filler sentences with the last two filler sentences they saw being dependent on list (as mentioned previously, these were the exclusive fillers). (The complete list of fillers that were utilized in the experiment can be found in Appendix E.)

4.4 Organizing stimuli in Qualtrics and pseudo-randomization

Once the experimental items and filler items were completed, the next task was to input them all into the survey software and implement pseudo-randomization. As with the pilot, the final experiment used the Qualtrics platform. In light of the pilot participant debriefings, pseudo-randomization was used to combat learning effects and participant fatigue applying to certain experimental items. A system was created in order to ensure a set number of filler sentences (i.e. two) between each experimental item and the lists were split in such a way that sentence pairs from the same sentence set would never be seen in the same half of the survey. For this, I used a block and randomization system within Qualtrics. The specific details for this system are as follows.

Experimental items were divided into two blocks: α block and β block. These blocks (which I call “Greek Blocks”) were to help ensure that not too many parallel versions of a sentence were seen in close proximity to each other. I then equally allocated “A” versions (the sentence in a pair
that had no NPI) and "B" versions (the sentence in a pair that had an NPI) to α and β blocks, so that they were in complementary distribution to each other. In practice, α block received A versions of sentences 1-6 and B versions of sentences 7-12 while β block received B versions of sentences 1-6 and A versions of sentences 7-12.

Within Greek Blocks, I created 12 different sub-blocks of sentences (which I call “Duodecim Blocks”), each with three sentences. The second sentence of each block contained an experimental item. The first and third sentence were filler items. This is to ensure there were always two fillers between each experimental item.

Each Greek Block received a near-equal distribution of "A" (unmodified) and "B" (modified) fillers. No Greek Block received both versions of the same filler sentence (in most cases, the opposing version appeared in the other Greek Block, excepting the versions that were used in the Warm-up and End fillers). α block received the even-numbered Short Story fillers (excepting F30, which appeared in the End fillers) and β block received the odd-numbered Context fillers (excepting F33, which appeared in the Warm-up fillers). Each Greek Block received one exclusive filler sentence apiece.

Within Duodecim Blocks (the three-sentence blocks, ordered filler-experimental-filler), parallel versions of experimental items were grouped with completely different filler sentences (e.g. Experimental item 1A was grouped with F1B and 14-JUST, while parallel experimental item 1B was grouped with F21A and F16B). 3 Warm-Up fillers (WU#) and End fillers (E#) were selected to bookend the 24 Duodecim Blocks. Each triad group received one A version, one B version, and one Short Story filler.

With the sentences all divided into blocks, the last step was to implement the randomization. Qualtrics supplies randomizers which can change how the survey is presented to
participants. In order to get the desired effect, I created a total of three randomizers: one to randomize the Greek Blocks and two to randomize the Duodecim blocks.

Randomizer 1 simply randomized the two large Greek Blocks, with the “evenly present elements” option checked (this ensured that an equal number of participants saw each ordering of Greek Blocks). The reason for this was to combat a learning effect phenomenon of specific halves (e.g. one Greek Block consistently getting higher ratings). Randomizers 2 and 3 randomized the 12 Duodecim blocks within the two Greek Blocks (again, to combat a learning effect). As mentioned before, these Duodecim blocks were created to ensure two fillers between experimental items. (For a full list of all items seen in each list, complete with arrangement into Greek and Duodecim blocks, see Appendix H.)

4.5 Presentation and distribution of survey

4.5.1 Mechanical Turk details

Recruitment for the survey was done through Amazon Mechanical Turk. I created three different Human Intelligence Tasks (HITs), one for each version. These HITs were much the same, only differing slightly in title (e.g. “Judging Variations of English Sentences, List A” vs. “Judging Variations of English Sentences, List B”) as well as survey link and survey password.

All three versions of the HITs required Masters workers (high-performing workers as statistically analyzed by Mechanical Turk), meaning that workers without this “Masters” status could not view or accept them. The listed reward per assignment was $2.34 ($0.03 per question)
and they were given two hours\textsuperscript{26} to complete the request after accepting it. The description and keywords for all HIT lists were as follows:

\begin{quote}
\textbf{(40) Description and Keywords for Mechanical Turk HITs}

\textbf{Description}: You will be redirected to a Qualtrics survey where, after a training session, you will be asked to judge the acceptability of English sentences on a scale from 1-6. Requirements: Native English Speaker (American). Estimated time to complete: 20-30 minutes

\textbf{Keywords}: survey, experiment, English, sentence judgments, linguistics, language
\end{quote}

When workers previewed my HIT, they were first presented with a list of Qualifications which they were prompted to read before proceeding. This section outlined that workers had to be native speakers of American English and had to be at least 18 years of age. It also informed them that in order to be eligible for monetary compensation they were required to 1) only participate once (across all lists), 2) complete all questions within the Qualtrics survey (with no obvious signs of carelessness), and 3) enter their survey completion code back in Mechanical Turk (in order for me to match Qualtrics surveys to Mechanical Turk surveys). To signify their compliance, they had to either select “YES” or “NO” underneath the Qualifications section.

\textsuperscript{26} The time allotted per assignment was originally set for one hour, but after the first few batches, I increased it to two hours after I received direct feedback from a worker who told me they nearly ran out of time.
Below the verification section, they were then given a link to the Qualtrics survey (as well as the password for the survey). These survey links and passwords differed, depending on which version (A, B, or C) the HIT was for. Below the links and passwords, a text box was provided for
them to enter their survey completion code when they had finished. This survey code was generated by the Qualtrics survey.

**Figure 3: Completion code entry**

![Survey completion code entry](https://qtrial2018q2.az1.qualtrics.com/jfe/form/SV_9RyDx702Oku95Vr)

In addition to the visible aspects of the survey, there were also some parts in the code of the survey that the user was unaware of. Using Foster’s techniques (Foster 2015), I used Unique Turker (Ott 2013) to generate a script that would prevent the same Mechanical Turk worker ID from accessing other versions or batches of my HIT. This method, though handy, can still be circumvented by savvy workers, so I had to also individually check my workers as results came in to ensure that no two surveys were completed by the same worker.

Between all lists run, only four workers’ HIT submissions were rejected (one for List B and three for List C). Three were rejected for not agreeing to the terms on the Mechanical Turk survey and one was rejected for scoring most sentences on the entire 78 question survey with the highest rating of a “6.” Rejected participants did not receive compensation and none of their data was used in the experiment. For the remaining 90 participants who were accepted, they were compensated the advertised amount of $2.34. While each HIT was set to auto-approve and pay workers within 7 days (as mentioned previously), I manually approved or rejected each individual worker’s submission. In most cases, I did this within 48 hours of the worker completing my request.
4.5.2 Qualtrics details

The survey itself was conducted wholly in Qualtrics. When a participant clicked on the link from the Mechanical Turk assignment, they were brought to a version of my experiment. They were prompted for a password, which was version specific and was simply used to ensure that other people (i.e. not from Mechanical Turk) would not accidentally stumble upon my survey and begin filling it out.

The survey was divided into five major sections: information and consent, demographics questions, instructions and tutorial, sentence rating questions, and survey completion. The information and consent section explained to the participants that this was a research study and that they would have to give informed consent in order for their responses to be utilized. After that they were given the full IRB-approved consent form (see Appendix G) which they were expected to read and keep a copy for their records. Below the consent form was the first question of the survey which had two radio buttons for them to pick between:

(41) Consent Question for Survey
Select an option below to give your informed consent for this survey. You must give consent for me to utilize your response. Please do not continue with this survey if you decline to give informed consent.

YES: I have read the above information and give my consent to the terms outlined within it.

NO: I have read the above information and do NOT give my consent to the terms outlined within it.

This was a forced-choice survey question, meaning that they could not proceed until they had selected either “YES” or “NO.”
Next, the participants were presented with three demographics questions, which were selected for possible use when analyzing the data. Participants were asked to fill in a text box with their age, pick from three identified gender options (“Male,” “Female,” or “Other”), and fill in a text box with the geographical state (e.g. “New York” or “Texas”) that they felt contributed the most to the way they currently speak English. These demographics questions were not forced choice, meaning that participants could choose to decline to answer if they wished. All compensated participants, however, filled out all demographics questions.

The instructions and tutorial section detailed critical information of how participants should process the sentences of the experiment. It explained how some sentences would be preceded with a “Situation” (these were the Short Story questions) and some would not. For the sentences with a given situation, participants were expected to evaluate them both on their grammatical acceptability and their truthfulness. For sentences without a situation, they were simply asked to evaluate them on their grammatical acceptability. The instructions also explained that capitalized letters were to indicate emphasis (either by verbal stress or a louder voice) and pointed out that though some sentences may appear very similar, they were expected to evaluate them all individually. Five tutorial sentences were provided (four without situations and one with an accompanying situation) with the same rating scale (1-6) as the non-tutorial sentences. Four of these tutorial questions were followed by explanations of what type of rating was expected as well as the rationale behind that rating. (For the complete instructions and list of tutorial questions, see Appendix H.)

The sentence rating section directly followed the instructions and tutorial section and comprised the majority of the survey. Questions were presented one at a time, each on their own individual screen. Each screen featured a sentence followed by a reminder of what they were being asked to do (i.e. choose a rating for their acceptability judgment with 1 being “Completely
Unacceptable” and 6 being “Completely Acceptable”). Emoji faces accompanied the rating numbers as an easy reminder of what level of acceptability each given number was expected to imply. An example screen of one of these sentence question screens can be seen below in Figure 4:

**Figure 4: Qualtrics question screen**

Each sentence rating question was forced-choice, meaning that participants could not proceed to the next screen before rating the sentence. Participants could only choose to go forward in the survey (never back) and there was no progress bar to indicate how close they were to the end of the survey.

The last section of the survey was survey completion. Here, participants were informed that they had completed all questions and given a completion code (a randomized 5-digit number
created by Qualtrics). They were prompted to copy this code back into their Mechanical Turk HIT request and, once done, complete the Qualtrics survey.

5 Experiment Results and Analyses

The following section details the results of the experiment as well as the statistical analyses. The data reported and analyzed utilizes all 90 compensated experiment participants since no participant’s mean was beyond 1.5 times the interquartile range above the third quartile or below the first quartile (M = 4.59, SD = 1.54).

Based on the results of the pilot and my experiment design, these were my predictions for the experiment prior to viewing the results and analyzing the data:

(42) Experiment Predictions

Prediction 1: Participants will find the JUST and ONLY versions of the NO-NPI (A version) sentences more or less equally acceptable

Prediction 2: Participants will find the JUST versions of the NPI (B version) sentences markedly worse than ONLY versions.

Prediction 3: Participants who, on average, judge the JUST versions of the NPI (B version) sentences to be more acceptable will also find the JUST versions of the exclusive fillers to be more acceptable

These predictions will be referred back to in the subsections of this chapter.
5.1 Results

The data were prepared utilizing the following parameters:

(43) **Data parameters**

- **Participant identifier**: a unique identifier
- **List**: Which of the three lists the participant saw (A, B, or C)
- **Full Identifier**: A unique identifier for each sentence.
- **Rating**: The rating the participant gave this sentence on a scale from 1 (Completely Unacceptable) to 6 (Completely Acceptable).
- **Sentence Set**: What sentence set the sentence belonged to (1 – 12, for 12 sentence sets)
- **Version**: Whether this sentence was a NEG, ONLY, or JUST sentence
- **NPI or no NPI**: Whether the sentence contained an NPI or not.
- **Any or Ever**: If the sentence contained an NPI, whether that NPI was *any* or *ever*. If the sentence did not contain an NPI, it was marked as N/A.

The data used in the following analyses consisted of ratings of all 24 experimental sentences by each participant for a total of 2160 ratings.

Table 1 shows the means and standard deviations of the ratings by sentence version and NPI category. In each cell, the mean is the top value with its standard deviation in parentheses below it.
Table 1: Means (standard deviations) of ratings by version and NPI category

<table>
<thead>
<tr>
<th>Version</th>
<th>NPI Category</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No NPI</td>
<td></td>
</tr>
<tr>
<td>NEG</td>
<td>5.22 (1.17)</td>
<td>4.99</td>
</tr>
<tr>
<td>JUST</td>
<td>4.82 (1.23)</td>
<td>3.71</td>
</tr>
<tr>
<td>ONLY</td>
<td>5.16 (1.12)</td>
<td>4.41</td>
</tr>
<tr>
<td>Mean</td>
<td>5.07</td>
<td>4.20</td>
</tr>
</tbody>
</table>

Descriptively, there are several points to note. First is that the NEG version had the highest rating mean in all three NPI categories. This is as expected – all NEG versions were intended to be completely acceptable grammatical. What this same comparison demonstrates, however, is that the rating mean is higher for ONLY than JUST in all three categories as well. Furthermore, whereas there’s not a very large difference between ONLY + no NPI (M = 5.16) and JUST + no NPI (M = 4.82), there’s a sizeable rating mean difference between their NPI counterparts: ONLY + any’s M = 4.04 compared to JUST + any’s M = 3.39 and even more drastic, ONLY + ever’s M = 4.03 to JUST + ever’s M = 2.92. If we were to divide the six-point scale into a binary judgment of “acceptable” vs. “unacceptable” (with <3.5 being unacceptable and >3.5 being acceptable), both of JUST’s NPI versions would fall on the unacceptable side, whereas JUST without an NPI and all three iterations of ONLY would be on the acceptable side.

I also analyzed the same data using a 2x2 design, where I dropped the NEG data and only looked at whether the sentence had an NPI or not (i.e. I treated any and ever as the same category). When any and ever were analyzed together as NPIs, the rating mean for ONLY + NPI (M = 4.04, SD = 1.59) was still much higher than the rating mean for JUST + NPI (M = 3.15, SD = 1.68).
5.2 Analyses

For all of my statistical analyses, I used R (R Core Team 2012) and *lme4* (Bates, Maechler, Bolker and Walker 2015). I ran a total of four models (two 3x3 and two 2x2) and one correlation.

5.2.1 3x3 Linear Mixed Effects Analysis

The 3x3 linear mixed effects analyses looked at the relationship between rating and version, one with interaction (the “full model”) and one without interaction (”model without interaction”). As fixed effects, I used version and NPI category (no NPI, *any*, or *ever*), and their interaction term, in the full model. As random effects, for participant and sentence set, I used random intercepts and slopes for version, NPI category, and the interaction between version and NPI category. Table 2 shows the fixed effects for this model, with the intercept (Intr.) representing JUST, no NPI.

<table>
<thead>
<tr>
<th>Version * NPI Category</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Deg. Of Freedom</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUST, no NPI (Intr.)</td>
<td>4.82</td>
<td>0.114</td>
<td>35.84</td>
<td>42.15</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>NEG</td>
<td>0.39</td>
<td>0.112</td>
<td>22.91</td>
<td>3.50</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>ONLY</td>
<td>0.34</td>
<td>0.084</td>
<td>97.37</td>
<td>4.07</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>any</td>
<td>-1.48</td>
<td>0.159</td>
<td>100.48</td>
<td>-9.32</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ever</td>
<td>-1.85</td>
<td>0.172</td>
<td>99.27</td>
<td>-10.76</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>NEG : any</td>
<td>1.38</td>
<td>0.188</td>
<td>119.19</td>
<td>7.33</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>NEG : ever</td>
<td>1.26</td>
<td>0.198</td>
<td>102.62</td>
<td>6.35</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ONLY : any</td>
<td>0.31</td>
<td>0.165</td>
<td>112.36</td>
<td>1.88</td>
<td>p = 0.062</td>
</tr>
<tr>
<td>ONLY : ever</td>
<td>0.77</td>
<td>0.151</td>
<td>117.15</td>
<td>5.09</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

Table 2: Mixed effects analysis of model: Rating ~ Version * NPIcategory + (1 + Version * NPIcategory | Participant) + (1 + Version * NPIcategory | Sentence)
As Table 2 indicates, each main effect was a significant predictor as was the interaction between version and NPI category with the exception of one level combination (ONLY: any, where the p value was marginal at 0.062).

For the model without the interaction, I used version and NPI category as fixed effects, without their interaction term, in the model. As in the full model, I used random intercepts and slopes for version, NPI category, and the interaction between version and NPI category as random effects for participant and sentence set. Table 3 shows the fixed effects for this model, with the intercept (Intr.) representing JUST, no NPI.

<table>
<thead>
<tr>
<th>Version + NPI Category</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Deg. Of Freedom</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUST, no NPI (Intr.)</td>
<td>4.42</td>
<td>0.104</td>
<td>26.70</td>
<td>42.46</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>NEG</td>
<td>0.65</td>
<td>0.107</td>
<td>18.07</td>
<td>6.08</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ONLY</td>
<td>0.46</td>
<td>0.070</td>
<td>51.43</td>
<td>6.55</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>any</td>
<td>-0.48</td>
<td>0.080</td>
<td>203.91</td>
<td>-6.00</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ever</td>
<td>-0.68</td>
<td>0.102</td>
<td>118.04</td>
<td>-6.63</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

Table 3: Mixed effects analysis of model: Rating ~ Version + NPIcategory + (1 + Version * NPIcategory | Participant) + (1 + Version * NPIcategory | Sentence)

This reduced model shows both main effects to be significant (p < 0.001 for each level).

When the full model and the model without the interaction were compared (using ANOVA), the difference was statistically significant ($\chi^2 (4) = 58.593, p < 0.001$), with the full model (AIC = 6934.3) being favored over the model without the interaction (AIC = 6984.8).

The 3x3 models show a promising story, one where version is a significant main effect and NPI category is a significant main effect. We also see a significant interaction between version and
NPI category, since the full model with the interaction was a better fit to the data than the model without the interaction. The reader will note, however, that these models distinguish between any and ever; when the theory and predictions were based on NPIs in general. To more directly address this issue, I tested a second set of models.

5.2.2 2x2 Linear Mixed Effects Analysis

The 2x2 linear mixed effects analyses also examined the relationship between rating and version, but with only two versions (JUST and ONLY) and two NPI conditions. I trimmed the data to exclude the NEG version (since, as mentioned in the methodology, it was mostly there to act as a control\(^{27}\)) and simplified the NPI conditions to the presence or lack of an NPI (c.f. with the prior models with three conditions: no NPI, any or ever). These analyses are more directly relevant for our purposes as they enable us to look at the NPIs as one category instead of two. The theory posits that both of these weak NPIs should uniformly either be licensed or unlicensed by just and only.

Like the 3x3 analyses, I ran one model with the interaction (the “full model”) and one without (“the model without interaction”). As fixed effects, I used version and NPI category (no NPI and NPI), and their interaction term, in the full model. As random effects, for participant and sentence set, I used random intercepts and slopes for version, NPI category, and the interaction between version and NPI category. Table 4 shows the fixed effects for this model, with the intercept (Intr.) representing JUST, no NPI.

\(^{27}\) This model also would not converge with the inclusion of the NEG data – likely due to the differences between NEG + ever and NEG + any ratings.
<table>
<thead>
<tr>
<th>Version * NPI Category</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Deg. Of Freedom</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUST, no NPI (Intr.)</td>
<td>4.82</td>
<td>0.123</td>
<td>29.31</td>
<td>39.15</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ONLY</td>
<td>0.34</td>
<td>0.089</td>
<td>72.70</td>
<td>3.83</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>NPI</td>
<td>-1.66</td>
<td>0.145</td>
<td>92.89</td>
<td>-11.46</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ONLY: NPI</td>
<td>0.54</td>
<td>0.128</td>
<td>177.71</td>
<td>4.22</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

Table 4: Mixed effects analysis of model: Rating ~ Version * NPIcategory + (1 + Version * NPIcategory | Participant) + (1 + Version * NPIcategory | Sentence)

For the 2x2 model without interaction, I used version and NPI category, without interaction term, in the model as fixed effects. For the random effect of participant, I used random intercepts and slopes for version, NPI category, and their interaction term. Table 5 shows the fixed effects for this model, with the intercept (Intr.) representing JUST, no NPI.

<table>
<thead>
<tr>
<th>Version + NPI Category</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Deg. Of Freedom</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUST, no NPI (Intr.)</td>
<td>4.66</td>
<td>0.116</td>
<td>24.73</td>
<td>39.98</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ONLY</td>
<td>0.53</td>
<td>0.075</td>
<td>34.77</td>
<td>7.02</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>NPI</td>
<td>-1.35</td>
<td>0.125</td>
<td>90.03</td>
<td>-10.80</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

Table 5: Mixed effects analysis of model: Rating ~ Version + NPIcategory + (1 + Version * NPIcategory | Participant) + (1 + Version * NPIcategory | Sentence)

When the full model and the model without interaction were compared (using ANOVA), the difference was statistically significant (χ²(1) = 16.852, p < 0.001), with the full model (AIC = 4776.2) being favored over the model without the interaction (AIC = 4791.0).

The findings are exciting for multiple reasons. First, the 2x2 full model analysis revealed a significant main effect for version (adjusting from JUST to ONLY: p < 0.001). It also revealed a significant main effect for NPI category (adjusting from JUST + no NPI to JUST + NPI: p < 0.001).
Together, these findings directly support Prediction 2, as these numbers represent a large degree of confidence that these two predictors are the source of the variance in the means. When compared with the model without the interaction, the full model with the interaction was a significantly better fit to the data, giving us a significant interaction between version and NPI category (p < 0.001).

Tukey post hoc tests indicated that there was no significant difference between JUST + noNPI and ONLY + noNPI. This corresponds to Prediction 1; there was no reason we expected there to be a significant difference between these two groupings of ratings, as we expected participants to find them more or less equally acceptable. The significant difference that was expected does bear out: the model revealed a significant difference between JUST + noNPI and JUST + NPI (p < 0.001).

All of the Tukey pairwise comparisons are shown in Table 6 below:

<table>
<thead>
<tr>
<th>Tukey Comparison</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>z value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUST: noNPI – JUST:NPI == 0</td>
<td>-4.48</td>
<td>0.186</td>
<td>-24.14</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ONLY: NPI – JUST:NPI == 0</td>
<td>-6.49</td>
<td>0.224</td>
<td>-29.00</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ONLY: noNPI – JUST:NPI == 0</td>
<td>-4.28</td>
<td>0.146</td>
<td>-29.26</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ONLY: NPI – JUST: noNPI == 0</td>
<td>-2.01</td>
<td>0.160</td>
<td>-12.50</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>ONLY: noNPI – JUST: noNPI == 0</td>
<td>0.20</td>
<td>0.191</td>
<td>1.03</td>
<td>p &gt; 0.6</td>
</tr>
<tr>
<td>ONLY: noNPI – ONLY: NPI == 0</td>
<td>2.20</td>
<td>0.238</td>
<td>9.27</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

Table 6: Tukey pairwise comparisons for Rating ~ Version * NPIcategory + (1 + Version * NPIcategory | Participant) + (1 + Version * NPIcategory | Sentence) model

The reader will note that there was also a significant difference between ONLY + noNPI and ONLY + NPI, which was not necessarily expected, but neither confirms or disproves the established predictions.

The significant main effects and the significant interaction allow us to directly compare the relative difference between ratings. The difference between noNPI and NPI for ONLY (5.16 - 4.04 =
1.12) was smaller than it was for JUST (4.82 - 3.16 = 1.66). This means that overall participants found there to be a bigger difference between the two NPI categories of the JUST versions than the ONLY versions, which is as expected under Prediction 2. This supports the overarching theory that just and only have different behavior patterns when interacting with NPIs.

6 The Experimental Findings Applied to the Theory

We now have concrete data supporting the theory that while only can license NPIs, just cannot. None of the prior semantic literature can account for these findings, leading me to propose my own theory regarding the structures and semantics of these two different exclusives. Before we turn to that, though, we must understand how NPI licensing is analyzed in the current literature and how differences in modal/scope interactions contribute to this discussion.

6.1 Downward entailing environments as NPI licensors

Now we must ask the question of what constitutes a valid NPI licenser. Fauconnier (1975) and Ladusaw (1979) propose that NPIs are licensed under a specific environment, called a “downward entailing” (also known as “downward monotone”) or DE environment. NPI licensors create these DE environments:28

(44)  a. **Downward Monotonicity:** The expression α occurs in a simple downward monotone position of the sentence ϕ iff for any β which is stronger than α, ϕ entails ϕ [α / β]. If α is a set-denoting term, then a stronger term would be a narrower one (i.e. one denoting a subset). If α is a proposition, then strength means logical

---

28 This condition has been widely adopted as the standard for NPI licensing (among others: Krifka 1990; von Fintel 1999; Beaver & Clark 2008) and as such has played an important role in my research on this matter.
strength, so \( \beta \) ranges over expressions that entail \( \alpha \), e.g. a conjunction containing \( \alpha \) as one conjunct.

b. **Example:** John did not eat lunch with Mary \( \rightarrow \) John did not eat lunch with Mary and Bob (Conjoined phrase *Mary and Bob* is stronger than *Mary*)

(45) a. **Upward Monotonicity:** The expression \( \alpha \) occurs in an upward monotone position of a sentence \( \phi \) iff for any \( \beta \) which is weaker than \( \alpha \), \( \phi \) entails \( \phi[\alpha /\beta] \).

b. **Example:** Tim ate carrots \( \rightarrow \) Tim ate vegetables (vegetables is weaker than carrots, as carrots is a subset of vegetables)

(Definitions, but not examples, in (21) and (22) provided by Beaver & Clark 2008)

(46) **NPI being licensed by negation**

a. Tim did **not** eat any vegetables

Demonstration of DE environment

b. Tim did **not** eat vegetables \( \rightarrow \) Tim did **not** eat carrots

(47) **NPI being licensed by negation**

a. Oliver hasn’t ever visited Europe

Demonstration of DE environment

b. Oliver hasn’t visited Europe \( \rightarrow \) Oliver hasn’t visited France

(48) **NPI not being licensed**

a. * Tim ate any vegetables

Demonstration of non-DE environment

b. Tim ate vegetables \( \nRightarrow \) Tim ate carrots
In (46a), we see that NPI *any* is licit in this environment. (46b) demonstrates that it is permissible there since the environment is downward monotone. If *carrots* is substituted for *vegetables* (substituting a subset for a set), we see that the original sentence (with the NPI removed) “Tim did not eat vegetables” entails the new sentence “Tim did not eat carrots.” (47a) and (47b) demonstrate a similar phenomenon with NPI *ever*. Sentence (48a), “Tim ate any vegetables,” is an unacceptable sentence, however. (48b) shows that in this case the environment is not downward entailing; “Tim ate vegetables” does not entail “Tim ate carrots” (Tim could have eaten another kind of vegetable, such as beets).

### 6.2 Downward entailing environments, ‘only,’ and ‘just’

Now that the traits of a valid NPI licenser (under a traditional semantic account of NPIs) have been clearly defined, we can more carefully examine *only* and *just* in regard to NPI licensing. It turns out that *only* does not create a simple downward monotone environment, which is problematic, since *only* can license NPIs (though, crucially, they must be located outside of the focus associate). Below are two examples of *only* licensing NPIs in a clearly non-DE environment:

(49) a. **Only** [Vincent]$_F$ has *ever* visited Europe.

   b. **Only** Vincent has visited Europe $\not\Rightarrow$ **Only** Vincent has visited Spain.

---

29 When NPIs appear within the focus associate of *only* in grammatical sentences, it has been posited that they are licit for some reason other than the presence of *only* (Horn 1996; Beaver & Clark 2008). This has been theorized because *only* can be removed in these cases and still produce a grammatical sentence. For example:

(i) **Only** people who have *ever* had a debilitating illness themselves can appreciate what an ordeal this was.  
   (Linebarger 1987)

(ii) People who have *ever* had a debilitating illness themselves can appreciate what an ordeal this was.  
   (Beaver & Clark 2008)
a. Isabel only [texts] any of her friends on weekends. (i.e. she doesn’t do anything more than text them, such as call them or visit them)

b. Isabel only texts her friends on weekends ≠ Isabel only texts her friends on Saturdays.

Examples (49a) and (50a) are acceptable English sentences, but (49b) and (50b) demonstrate that if we apply the same downward monotonicity test from examples (46) – (48), it does not appear that these are downward entailing environments. The presuppositions of the (b) examples are not entailed by the presuppositions of the (a) examples. If, in a given context of a group of people, Vincent is the only person who has visited Europe, it doesn’t necessarily follow that he is the only one who has visited Spain (a country contained completely within Europe, so the set of individuals that have visited Spain is a subset of the individuals that have visited Europe). He could have visited Europe without visiting Spain at all. Similarly, if Isabel only texts her friends on weekends, it doesn’t necessarily follow that she only texts them on Saturdays. She could text them on Sundays and not Saturdays, and (50a) would still be true.

It is this kind of puzzle that led von Fintel (1999) to propose what he calls “Strawson Entailment:”

(51) **Strawson Downward Entailment**

A function f of type <σ, τ> is Strawson-DE iff for all β, α of type σ such that β → α and f(β) is defined: f(α) → f(β)

(von Fintel, 1999)
Strawson Downward Entailment (SDE) is a condition on downward entailment utilized when checking the monotonicity as outlined in (44a) above. It is weaker than standard DE due to the fact that all DE environments are SDE environments, but not all SDE environments are DE environments. In effect, it checks for downward entailment \((f(\alpha) \rightarrow f(\beta))\) with the added condition that the conclusion \((f(\beta))\) is defined (recall that the presupposition of ONLY(S) was the condition on S being defined in our Horn/Rooth account of only in Section 2.2). It predicts NPI licensors such as _only_ to be downward monotone in this broader sense as well as the NPI licensors that had no erroneous predictions under standard downward monotonicity (e.g., forms of negation).

While a SDE account of NPI licensing may explain why _only_ can license NPIs (even when in subject position), it is still problematic for _just_. Like _only_, _just_ appears to be downward monotone given Strawson downward monotonicity\(^{30}\), but they differ in regard to Negative Polarity Item (NPI) licensing. This is a complication, because if _just_ is assumed to have the same structure as _only_ and SDE is assumed to be the condition on NPI licensing, _just_ should be able to license NPIs as well. Now to repeat the SDE test on sentence (50a), replacing _only_ with _just_

(52)  # Isabel _just_ [texts]_f_ any of her friends on weekends. (i.e. she doesn't do anything more than text them, such as call them or visit them)

(53)  a. \(\beta \rightarrow \alpha\): Saturdays \(\rightarrow\) weekends (Saturdays, \(\beta\), is a subset of weekends, \(\alpha\))

b. \(f(\beta)\) is defined: Isabel texts her friends on Saturdays.

c. \(f(\alpha)\): Isabel texts her friends on weekends

\[\therefore\] Isabel _just_ texts her friends on Saturdays \((f(\alpha) \rightarrow f(\beta))\)

\(^{30}\)Also anti-additive, given Strawson anti-additivity (Gajewski, 2011); however, anti-additivity is utilized for strong NPIs, which is outside of the scope of this paper.

(i) A function \(F\) of type \(<\sigma, \tau>\) is **anti-additive** iff for all \(x, y\) of type \(\sigma\):

\[F(x \lor y) \leftrightarrow F(x) \land F(y)\]

(ii) A function \(F\) of type \(<\sigma, \tau>\) is **Strawson anti-additive** (SAA) iff for all \(x, y\) of type \(\sigma\):

\[F(x \lor y) \leftrightarrow S F(x) \land F(y)\]

(Gawjewski, 2011)
As (53) demonstrates, *just* is capable of producing a SDE environment, just like *only*. This is a problem, since *just* is apparently not an NPI licenser (as exhibited in (20)). Two possible conclusions immediately arise from this realization:

(54) **Possible conclusions from NPI observations:**

**Conclusion 1 (Strong):** NPI licensing is not determined by DE (or, if following von Fintel 1999, SDE) environments

**Conclusion 1 (Weak):** NPI licensing by *only* is not determined by SDE environments

**Conclusion 2:** *just* and *only* have different structures: *only* creates a DE (or, if following von Fintel 1999, SDE) environment, *just* does not.

Conclusion 1 (combined weak and strong) is undesirable because pursuing it forces us to follow one of two problematic paths: the strong version or weak version. The first option (strong version) concludes that *only* and all other NPI licensers license NPIs in the same manner, and that manner is not reliant on DE or SDE environments. This would force us to find an entirely different way to account for all the NPI licensing data, directly disagreeing with the widely accepted theory established by Fauconnier (1975) and Ladusaw (1979). The second option (weak version) concludes *only* does not license NPIs through DE or SDE environments, but other NPI licensers do. This option is no less problematic, since treating *only* as different from all other NPI licensers also goes against much of the work that has been done on NPIs and their licensers since Fauconnier (1975) and Ladusaw (1979).

Conclusion 2 is a much more conservative claim which does not inherently run counter to a well-established theory of NPI licensing. Before outlining my theory (which follows Conclusion 2)
in section 6.4, I will first turn to the other difference between *only* and *just* that has motivated my theory: the divergence of *only* and *just* when interacting with modals.

6.3 Modal/scope interaction differences

Another striking difference between *just* and *only* is the way they interact with modals. *Just* and *only* differ in their scope behavior when combined with modals, which is also unpredicted, given their number of similarities. *Only* displays scope behaviors very similar to negation\(^{31}\): sometimes the modal scopes higher than *only*/negation, sometimes lower. *Just*, on the other hand, appears to always scope under the modal in the interpretation of a sentence that contains both *just* and a modal.

The examples below demonstrate the scope behavior of negation, *only*, and *just* when combined with several modals. All modals should be read deontically (permission reading), not epistemically (possibility reading):

**Scope of Modals and *Just/Only*:** comparison of scope behavior of negation, *just*, and *only* with modals *ought to, should, need to, should, may,* and *can*.

---

\(^{31}\) The scope relations of negation and modals are an ongoing topic of research. Some deontic modals (e.g. *can, may*) take scope under negation while others (e.g. *need to, must, ought to, should*) take scope over negation. The data are puzzling because some of the scope relations are representative of their Phonological Form (PF), but others are reversed. There is also no obvious correlation between modal type and behavior (e.g. it is not the case that universal deontic modals behave one way and existential deontic modals behave another). There are various theories for the data, including Cormack & Smith (2002), Iatridou & Zeijlstra (2013), and Homer (2015). All have their own differing accounts of this puzzling phenomenon. For our purposes, it is enough to observe that *only*'s scope relations mirror that of negation’s scope relations.
(55) Negation (not)

a. John ought to not eat bread.                   modal > negation
b. John need to not eat bread.                   modal > negation
c. John should not eat bread.                   modal > negation
d. John may not eat bread.                       negation > modal
   (also modal > negation)
e. John can not eat bread.                      negation > modal
   (also modal > negation)

(56) Exclusive only

a. John ought to only eat [bread].             modal > only
b. John need to only eat [bread].             modal > only
c. John should only eat [bread].              modal > only
d. John may only eat [bread].                 only > modal
   (also modal > only)
e. John can only eat [bread].                  only > modal
   (also modal > only)

(57) Exclusive just

a. You ought to just eat [bread].              modal > just
b. You need to just eat [bread].              modal > just
c. You should just eat [bread].               modal > just
d. You may just eat [bread].                  modal > just

32 Note that the modal can and negation must be separated (i.e. not joined together to form the contraction cannot,) to get both possible scopes. Thanks to Janet D. Fodor (p.c.) for reminding us of this fact.
e. You can just eat [bread]. modal > just

For the modals ought to, need to, and should, the only available scope interpretation is the modal scoping above negation/exclusive in (55) – (57); however, may and can differ. When paired with negation or only; both scope relationships are available for two possible interpretations. One of the interpretations is the surface scope, as expected, but the other interpretation is that of the inverse scope (with the NEG/only scoping over the modal). When paired with just, only the modal > exclusive interpretation is available, just like all of the other modals. This suggests that just is not able to demonstrate inverse scope, even with the modals that are known to support it. To compare one of the modals across sentences containing negation, only, and just, let us look at the (e) examples, which contain the modal can. This is produced below with full interpretations, for the reader’s convenience:

(58)  a. John can not eat bread35.
  
  **Interpretation 1:** John is unable to eat bread (NEG > can)
  
  **Interpretation 2:** John is allowed to not eat bread (can > NEG)

b. John can only eat BREAD

  **Interpretation 1:** The one thing John can eat is bread (only > can)
  
  **Interpretation 2:** John is allowed to eat bread and nothing else if he wants to. (can > only)

c. John can just eat BREAD

  **Blocked interpretation:** The one thing John can eat is bread

---

33 The modal > just scope interpretation appears to be the majority intuition, though some speakers are able to force a just > modal reading. It’s important to note, however, that even for these speakers, this reading is less salient than the other reading as well as marginal in its grammaticality.
34 See previous note.
35 Refer back to footnote 21
Interpretation: John is allowed to eat bread and nothing else if he wants to.

(58a) – (58c) only differ by one word: (58a) contains not, (58b) contains only, and (58c) contains just. The interpretations of (58a) – (58c) differ in that (58a) and (58b) have two interpretations (modal scoping over negation/exclusive and negation/exclusive scoping over modal) and (58c) only has one (modal scoping over exclusive). The interpretation that (58c) is missing is Interpretation 1 of (58b). While some native English speakers are able to force that interpretation onto (58c), it is substantially less salient than in the (58b) case.

Another interesting similarity can be seen when observing the modal need. Need is different than need to in its lack of inflectional morphology and its behavior of occurring before negation.

(59)  a. John need not eat bread  (NEG > need)

b. John need only eat [bread]$_F$  (only > need)

c. * John need just eat [bread]$_F$

English modal need is a special case of a universal deontic modal that is required to be interpreted inside the scope of negation (Iatridou & Zeijlstra 2013). In the case of (59a), the interpretation is that it is not the case that John is required to eat bread. The interpretation is not its surface representation of John is required to not eat bread. Similarly, in (59b), the interpretation is the one thing John is required to eat is bread. It does not follow the surface representation of John is required to eat bread and nothing else. Sentence (59c) is ungrammatical, for possibly more than

---

36 Iatridou & Zeijlstra 2013 also list some other modals that have this unique behavior, such as Dutch hoeven and German brauchen.
one reason. First, as observed above, just is reluctant to participate in inverse scope interpretations. Second, the modal need is commonly considered to be an NPI (Iatridou & Zeijlstra 2013, Van de Wouden 1994) and the experimental data supports the intuition that just cannot license NPIs.

These observations of only and just's differing modal scope interactions combined with the previous observation of only's ability to license NPIs provide strong motivation for a theory in which only has more in common with negation (be it similarity in structure and/or semantics) than just. A theory where only is in part formed by negation would facilitate in explaining why the two have so much in common in regard to their scope behavior with modals. It also might help account for the NPI-licensing differences between only and just since negation creates a DE environment, as we saw in 1.3.1. Von Fintel and Iatridou (2007), henceforth vF&I, propose a split account of only where the exclusive is made up of negation and an exceptive phrase. This type of approach fits the aforementioned criteria of explaining the negation-like property that only has that just doesn’t.

6.4. My theory on the different structure and semantics of ‘only’ and ‘just’

While many linguists have adopted some version of Horn’s (1969) theory of only, a very different theory of only is posited by vF&I (2007). This is the theory on which I have based my own. In their article, they propose that the scope of only splits into NEG + EXCEPTION (shortened to EXC), making it a “negative split” phenomenon. This terminology simply means that a single word is actually two elements semantically, with one of those elements being negation. In this section, I will discuss vF&I’s theory, explain how I modified it into my own theory to account for the exclusive differences outlined in Section 1.3, and then demonstrate its application with regard to the NPI and
modal/scope interaction differences. It should be noted that this theory is incomplete, as there are both clear advantages and clear disadvantages to it (which will be outlined).

### 6.4.1. Negative split and its application for ‘only’

The idea of negative split is attributed to Jacobs (1980), where it was utilized for splitting negative determiners (such as *no*) into two elements: negation and an existential quantifier (with negation taking wider scope over the quantifier)\(^{38}\). The data that led vF&I (2007) to propose a negative split account for *only* concerns a specific usage of *only*: in sentences that they call sufficiency modal constructions (SMCs). SMCs are observed to be used in very specific scenarios. An example of an SMC in English is as follows:

\[(60) \quad \text{To get good cheese, you only have to go to the North End! (vF&I, 2007)}\]

In SMCs, *only* appears before a modal, but if our assumptions about the prejacent (following Horn, 1969) are maintained, incorrect presuppositions are predicted:

\(^{38}\) Evidence for negative split mostly comes from examples in German and Dutch, where negation appears to be taking scope over another scopal element (such as a modal), with the existential quantifier scoping below that element:

**(i) Dutch** (Rullman, 1995):

\[
\begin{align*}
\text{Ze } & \text{ hoeven geen verpleegkundige te ontslann} \\
\text{They } & \text{ need no nurse to fire}
\end{align*}
\]

a. # It is necessary that they fire no nurse
b. For no nurse x does the following hold: it is necessary that they fire x
c. It is not necessary that they fire a nurse.

**(ii) English** (Heim, 2001)

I need *no* secretary.

**Reading 1**: It is not the case that I need a secretary

**Reading 2**: I need to not have a secretary.

I need to have *no* secretary.

**Reading**: It is not the case that I need to have a secretary.

\(\text{NEG} > \text{need} > \exists\) (secretary)
(61)  P: To get good cheese, you have to go to the North End.

   A: There is no place that is not the North End that you have to go to get good cheese.

The prejacent created by a Horn/Rooth account of *only* is certainly not a correct presupposition to an SMC. vF&I call this observed disconnect in meaning and compositional analysis of SMCs "the Prejacent Problem" and appealed to a split account of *only* in order to solve this issue.

When considering *only*, the idea of applying negative split doesn’t seem unreasonable; it’s often easy to paraphrase *only* as some form of negation and *except/but* with an existential quantifier (which translates to *someone* or *anyone*) intervening. This is demonstrated in (62):

(62)  a. John *only* invited [Beth]ₚ to the movie.

   b. It is not the case that John invited anyone except Beth to the movie.

   c. John *only* invited Beth to the [movie]ₚ.

   d. It is not the case that John invited Beth to anything except the movie.

   e. *Only* [Beth]ₚ went to the movie.

   f. It is not the case that anyone except Beth went to the movie.

As for the exceptive component of *only*, the exceptive proposed by vF&I is a special kind of exceptive, called the "QUE-phrase." The "QUE" label comes from the French *ne...que* construction.
(the French equivalent to only) and is pronounced accordingly. In English, vF&I translate QUE as “other than.” Essentially, what they are proposing is that only in English can be translated along the same lines as ne...que in French, meaning that “I only like John” can be translated to “It is not the case that I like anyone other than John” (informally broken down, piece-by-piece from English: “NEG I like ∃x QUE John”)

Semantically, QUE is an existential quantifier that scopes over alternatives. For example, “QUE John” introduces an existential quantifier over individuals other than John. The formula for the QUE-phrase is as follows, as well as an example of the assertion and presupposition of a QUE-phrase

\[
\lbrack\text{QUE John}\rbrack = \lambda Q. \exists x (x \neq \text{John} \text{ and } Q(x) = 1)
\]

\[
\text{(QUE John)} Q
\]

P: Q(John) = 1 (stronger version) OR

\[\exists x (Q(x) = 1)\text{ (weaker version)}\]

A: \[\exists y (y \neq \text{John} \text{ and } Q(y) = 1)\]

(vF&I, 2007)

Splitting only into two elements allows for the scope to be split as well. This is the key in addressing the Prejacent Problem. In the case of vF&I’s prototypical SMC (“To get good cheese, you only have to go to the North End”), NEG follows the subject you and the QUE-phrase is an existential quantifier that scopes over the VP [go to the North End]. The modal have to intervenes between the NEG and EXC, creating the scope of NEG > have to > QUE (in English: “it is not the case that you have to do anything other than — or in this case, logically stronger than — go to the North End”).

\[39\] Note that in (39) and (40), the predicate variable “Q” has been used instead of the more common “P” so as to not confuse the variable with the “P” that stands for “presupposition.”
This correctly predicts the observed reading of an SMC, provided that the weaker of the two potential presuppositions is used (i.e. $\exists x(P(x) = 1)$). To revisit their original SMC example:

(65) **A comparison of a non-split Horn/Rooth account vs. the split account of *only* for SMCs:**

    To get good cheese, you only have to go to the North End!

    a. **Non-split Horn/Rooth account**

    ONLY [to get good cheese you have to go to [the North End]]

    P: In all worlds where you get good cheese, you have to go to the North End.
    A: In all of the worlds where you get good cheese, there is nothing stronger you have to do than go to the North End.

    b. **vF&I split account**

    To get good cheese you NEG have to QUE [go to the North End]

    P: In all worlds where you get good cheese, you have to do something.
    A: In some of the worlds where you get good cheese, you don’t have to go anywhere other than the North End.

    Note that since the vF&I split account utilizes a weak presupposition, it no longer incorrectly predicts what needs to happen in order to satisfy the conditions of an SMC. It presupposes that you have to do something and asserts that going to the North End is a sufficient, but not necessary, way of acquiring good cheese.

---

40 This weaker existential presupposition of *only* was proposed by Horn (1996).
Another motivation for *only* to be split into NEG + EXC is based on cross-linguistic data. vF&I divide the languages that exhibit SMCs into two categories: NEG + EXC languages (like French, which has the aforementioned *ne...que* construction) and *only* languages (like English). If *only* could be classified as a covert NEG + EXC, vF&I reason, then that would be a huge step towards making the SMC phenomenon a more unified and universal phenomenon.

### 6.4.2. The structure and semantics for negative split ‘only’

Instead of following a traditional Horn (1969)/Rooth (1985, 1992) theory of the structure of *only*, I follow vF&I’s (2007) split account of *only*, where *only* is made up of NEG and a special kind of exceptive, QUE. I propose a split structure of *only* which is composed of NEG and QUE, as vF&I did, but with a crucial difference: I posit that the final scope has NEG scoping over QUE, rather than QUE scoping over NEG, as vF&I originally theorized. This structure also permits us to return to a Ladusaw-Fauconnier theory of NPI-licensing, with the NEG component of *only* creating a simple DE environment in which NPIs are licit. I will argue that it is this structure which creates the observed differences of NPI licensing and modal scope interactions for *only* and *just*.

For *only* we use the same type of exceptive (QUE) that vF&I (2007) utilized\(^4\). We assume that “John only likes [Beth]” has the following structure at LF:

\[
(66) \quad \text{John [NEG like [QUE Beth]]}
\]

At LF, NEG occupies the same position that *only* occupies at surface structure while the exceptive QUE resides just above the focus associate (in this case, *Beth*). Like vF&I, we will also

\(^{41}\) vF&I’s semantics can be found in (39) and (40) above.
assume that there is a quantifier meaning (i.e. *someone/something or anyone/anything*) bundled into the meaning of the QUE-phrase\(^{42}\) (recall how in (39) and (40) we demonstrated how the QUE-phrase semantically introduces an existential quantifier that scopes over alternatives). This results in \((66)\) having the interpretation “John doesn’t like anyone other than Beth.”

The proposed lexical entry for QUE is as follows:

\[(67)\quad \llbracket \text{QUE}_D \rrbracket^w(x)(P) \text{ is defined only if (i.e. presupposes that) } P(x) = 0 \text{ in } w.\]

If defined, \(\llbracket \text{QUE}_D \rrbracket^w(x)(P) = 1 \text{ iff } \forall y(y \in D \& y \neq x \Rightarrow P(y) = 1 \text{ in } w)\)\(^{43}\)

\[D = \text{the set of alternatives to the focus associate}\]

\[\llbracket \text{QUE}_D \rrbracket \text{ takes two arguments (}x\text{ and }P\). In a world (as designated by the superscript } w\), \(\llbracket \text{QUE}_D \rrbracket(x)(P) \text{ is defined only if } P(x) \text{ is false. If defined in that world, } \llbracket \text{QUE}_D \rrbracket(x)(P) \text{ is true if and only if for all } y, \text{ if } y \text{ is in the set of alternatives to the focus associate}(D) \text{ and } y \text{ is not the same as } x, \text{ then } P(y) \text{ is true in that world. This entry requires the QUE-phrase to quantifier-raise (QR) to be interpretable}\(^{44}\). In (36), [QUE Beth] is of type \(<<e,t,t>\) (the type of a generalized quantifier). Since generalized quantifiers are only interpretable at clausal nodes, it must raise. This results in the following structure:

\[\text{vF&l (2007) point out that there is a syntactic discussion to be had concerning whether the existential quantifier meaning is inherently bundled into the meaning of the QUE-phrase or whether it’s a covert existential quantifier being modified by the QUE-phrase. They elect to follow the former view for simplicity’s sake, which I also do here.}\]

\[\text{The formula in (43) is specific to when the focused element is of type e. If the focused element were of a different type (e.g. the focus associate was a verb), the types would be different, but the rest of the formula would be much the same.}\]
This deviates from vF&I, since QUE now scopes above NEG. In detail, since QUE, is an exceptive, it must take a focus associate. In the formula outlined in (67), the focus associate is of type e. The QUE-phrase is an existential quantifier that scopes over the alternatives to the focused element. These alternatives must also be of type e. This existential quantifier QRs to the top of a clause at LF, leaving behind a trace. A demonstration of this structure for the sentence “John only likes [Beth]” is found below. (A full semantic derivation of (69) can be found in Appendix B.)

(69) John only likes [Beth]

**Interpretation:** Other than Beth, it is not the case that John likes anyone

P: John likes Beth.

A: There is no person who is not Beth that John likes

---

45 Note that vF&I (2007) would likely disagree with this structure, as it would not aid them in the theoretical account of SMCs; however, this structure is still plausible, despite that.
Though described in much more detail in Appendix B, we can see that the semantics correctly predicts that $\llbracket \text{John only likes } \llbracket \text{Beth} \rrbracket F \rrbracket^w$ is defined only if John likes Beth is true and, if defined, John likes no one else in the context besides Beth. When applied to this sentence, our formula states that $\llbracket \text{John only likes } \llbracket \text{Beth} \rrbracket F \rrbracket^w$ is defined only if John likes Beth is true (the presupposition). It also states that if defined, $\llbracket \text{John only likes } \llbracket \text{Beth} \rrbracket F \rrbracket^w = 1$ iff $\forall y[y \in D \& y \neq b \rightarrow \text{It is not the case that John likes } y = 1 \text{ in } w]$ (the assertion). By supplying three other individuals for the context of the sentence (j for John, m for Mary, and g for George), we create the set of alternatives (D). $D = \{j, m, g\}$. The formula can then check all the individuals in the context (b, j, m, and g) and determine whether each of them is in the set of alternatives (D). If they are, and they are not b, then it will determine that it is not the case that John likes them to be true. If they aren’t in the set of D and they are b, then it will determine that it is not the case that John likes them to be false.

With this proposed structure for *only*, the different focalizations of “John only invited Beth to the movie” would provide the accompanying structures and interpretations:

(70) \( \text{John only invited } \llbracket \text{Beth} \rrbracket F \) to the movie

\[
\llbracket \text{[QUE}_D \text{ Beth}][\lambda x.\text{NEG John invited x to the movie}] \rrbracket
\]

Other than Beth, John did not invite anyone to the movie.

(71) \( \text{John only invited Beth to the } \llbracket \text{movie} \rrbracket F \)

\[
\llbracket \text{[QUE}_D \text{ the movie}][\lambda x.\text{NEG John invited Beth to x}] \rrbracket
\]

Other than the movie, John didn’t invite Beth to anything.

(72) \( \text{John only } \llbracket \text{invited} \rrbracket F \text{ Beth to the movie} \)

\[
\llbracket \text{[QUE}_D \text{ invited}][\lambda x.\text{NEG John x Beth to the movie}] \rrbracket
\]

Other than inviting, John didn’t do any action to Beth in regard to the movie.
The scalar meaning of *only* must also be available, so the semantics for QUE need to be slightly modified in the same way the old formula for *only* was modified in Section 2.2: by adding a scale.\(^46\).

\[(73)\] \&[QUE\(_n\)](x)(P) is defined only if (i.e. presupposes that) \(P(x) = 0\) in \(w\).

If defined, \&[QUE\(_n\)](x)(P) = 1 iff \(\forall y(y \in D \& y \not< S x \rightarrow P(y) = 1\) in \(w\))

\(D =\) alternatives to the focus associate

To return to the benefits of this formula and proposed structure of *only*: when the QUE-phrase scopes above NEG, *only* is able to license NPIs as well as exhibit a similar pattern of behavior as negation when with interacting with modals. As the reader will recall, *only* scopes over the same modals that NEG scopes over. This would follow from accepting a negative split theory of *only*: if *only* contains NEG, then it makes sense that it would act the same way in its behavior with modals. It also provides support for the necessity of negative split accounts of *only*.

Before returning in detail to NPI licensing and modal scope interactions with this proposed structure and semantics, I will first propose a contrasting structure and semantics for *just*. With the differing structure and semantics of both exceptives laid out, we will then be able to compare them side by side in regard to NPI-licensing and their scope relationship with modals.

\(^46\)The only modification is that \(y\) must now not be lower or equal to \(x\) on the relevant scale, rather than simply not equal to \(x\). This way, scalar interpretations for “John only met [an assistant professor] at the orientation” can be correctly analyzed (e.g. if tested with *a student*, the semantics would allow for John to have met him/her at the orientation, if *student* is lower than *assistant professor* in the given context).
6.4.3 The structure and semantics for single element ‘just’

Since *just* does not interact with modals in the same manner that *only* does, we have less reason to posit that it exhibits a similar NEG + QUE structure. Recall that *just* consistently scopes under the modal in previous example sentences, regardless of what the modal is ((57) is repeated here as (74) for the reader’s convenience):

(74) Exclusive *just*

a. James *ought to just* eat [bread].  
modal > *just*

b. James *needs to just* eat [bread].  
modal > *just*

c. James *should just* eat [bread].  
modal > *just*

d. James *may just* eat [bread].  
modal > *just*

e. James *can just* eat [bread].  
modal > *just*

Due to these observations, we propose the following lexical entry for *just*:

(75) $\llbracket just_C S \rrbracket^w$ is defined only if (i.e. presupposes that) $\llbracket S \rrbracket^w = 1$.

If defined, $\llbracket just_C S \rrbracket^w = 1$ iff $\forall S'(S' \in C) \& S \not\Rightarrow S' \rightarrow \llbracket S' \rrbracket^w = 0$

The reader will notice that this is the same lexical entry as for *only* under a Horn/Rooth account. If *just* is not a case of negative split, then it follows that *just* does not create a DE environment, since unlike *only*, *just* does not have a NEG element to create a DE environment. It does, however, still create a SDE environment, since given the prejacent of a sentence containing
only or just, if \( \alpha \) is an element outside of the focus associate and \( \beta \) is in the domain of \( \alpha \), then \( f(\beta) \) is presupposed following SDE \( (f(\alpha) \rightarrow f(\beta)) \).

The following is a parallel tree structure for “John only likes [Beth]_f” in contrast to the tree structure for the same sentence in section 1.4.2. (A full derivation of (76) can be found in Appendix C.)

(76) John just likes [Beth]_f

**Interpretation:** The only person that John likes is Beth.

*Figure 6: Proposed structure for John just likes [Beth]_f*

\[ C = \text{Set of alternatives to the presupposition} \]

The semantics correctly predicts that \( \llbracket \text{John just likes [Beth]}_f \rrbracket^w \) is defined only if \( \llbracket \text{John likes Beth} \rrbracket^w \) is true and, if defined, \( \llbracket \text{John just likes [Beth]}_f \rrbracket^w \) is true if John likes no one else besides Beth.
6.4.4 Split ‘only,’ non-split ‘just,’ and NPI licensing

There is one important difference between my proposed semantics for *just* and *only*: there is no negation in the structure of *just*. This lack of negation is the key to the divergence of the two exclusives regarding NPI-licensing and scope relations when interacting with modals.

As demonstrated in Section 6.2, both *only* and *just* are SDE. This is problematic if one follows a theory of a SDE environment licensing NPIs (as proposed by von Fintel 1999), since it incorrectly predicts that *just* will license NPIs. The new structures and semantics for *only* and *just* proposed in the previous sections will still make incorrect predictions of NPI-licensing under a SDE environment theory; however, if we revert back to a plain DE environment for licensing NPIs, the grammaticality of sentences containing NPIs and *only* or *just* are correctly predicted. The negation component of the NEG-split *only* creates a simple DE environment:

(77) John *only* knows that [Jerome] visited any of our friends in Sweden. (i.e. he doesn’t know that Mary visited them, too.)

**Structure**: [ [QUE\(_D\) Jerome][\(\lambda x.\)NEG John knows x visited any of our friends in Sweden]]

**Check for DE environment**: *Other than* Jerome, it is not the case that John knows that anyone visited our friends in Sweden → *Other than* Jerome, it is not the case that John knows that anyone visited our friends in Stockholm
(78) * John just knows that [Jerome]F visited any of our friends in Sweden. (i.e. he doesn’t know that Mary visited them, too.)

* Isabel just [texts]F any friends on weekends. (i.e. she doesn’t do anything more than text them, such as call them or visit them)

Structure: [justc [John knows that JeromeF visited any of our friends in Sweden]]

Check for DE environment: John just knows that JeromeF visited our friends in Sweden ≠ John just knows that JeromeF visited our friends in Stockholm

(77) and (78) show that if a simple DE environment is taken to be the condition for NPI-licensing (i.e. not SDE), the proposed structures and semantics in Sections 6.4.2 and 6.4.3 correctly predict that NPIs can be licensed by only, but not by just. They also demonstrate why only can only license NPIs outside of the focused phrase: if the entire QUE-phrase (which contains the focus associate) is raised above negation, it is not in a DE environment, thus an NPI cannot be licensed within it.

While simple DE environments were originally considered the condition for NPI-licensing (Ladusaw, 1979), the observations of only co-occurring with NPIs have made von Fintel’s (1999) theory of SDE environments licensing NPIs a long-standing theory as well. Ideally, one would want to have additional motivation for abandoning an NPI-licensing theory based on SDE environments outside of the current observations regarding these two exceptives.
There are, in fact, other reasons that a simple DE environment may be more desirable to a SDE environment as the condition for NPI-licensing. Homer (2008) points out several incorrect predictions that an NPI-licensing theory based on SDE makes, such as predicting an NPI to be licensed in the scope of the singular definite article (*the*)\(^{47}\) or incorrectly predicting grammaticality of certain sentences containing negation, *also*, and NPIs\(^{48}\).

As cases such as these demonstrate, while SDE is one possibility for accounting for *only* licensing NPIs, in some areas (e.g. some sentences containing the definite article and *also*) the SDE condition overgenerates. This type of evidence may motivate a theory that returns to a simple DE environment for NPI licensing. With our proposed theory of the differing structure and semantics of *just* and *only*, we posit such a return to simple DE.

---

\(^{47}\) Context: There is exactly one Russian student

* The Russian student texts any friends on weekends.
  
  a. \(\beta \rightarrow \alpha\): Saturdays \(\rightarrow\) weekends (Saturdays, \(\beta\), is a subset of weekends, \(\alpha\))
  
  b. \(f(\beta)\) is defined: A Russian student texts friends on Saturdays
  
  c. \(f(\alpha)\): A Russian student texts friends on weekends

  \(\therefore\) The Russian student texts friends on Saturdays (\(f(\alpha) \rightarrow f(\beta)\))

This problem can potentially be remedied by following Lahiri (1998) and discounting functions that are both SDE and SUE at the same time as possible NPI licensors (such as *the*); however, that won’t save the issue raised in the next footnote.

\(^{48}\) Context: Mary read some interesting book.

* I don’t think [John] *also* read anything interesting.

  (LF: not > *also* > any)
  
  a. \(\beta \rightarrow \alpha\): novels \(\rightarrow\) books (novels, \(\beta\), are in the domain of books, \(\alpha\))
  
  b. \(f(\beta)\) is defined: John read interesting books, too
  
  c. \(f(\alpha)\): John read interesting books, too

  \(\therefore\) I don’t think John *also* read interesting novels (\(f(\alpha) \rightarrow f(\beta)\))

This sentence contains negation, which is a SDE, non-SUE operator. According to a theory that utilizes SDE as a condition for NPI-licensing, the sentence should be able to contain an NPI within the scope of the SDE operator. As it turns out, an NPI is ungrammatical in this sentence. When this sentence is instead evaluated under a plain DE environment licensing condition, however, it is revealed that there is no potential for an NPI in the embedded clause: “I don’t think John also read interesting books” ≠ “I don’t think John also read interesting novels.”

Homer (2008) points out that it doesn’t appear to be the scope relationship of NEG > *also* > NPI that doesn’t allow for NPIs to be licensed, as evidenced in the following sentence:

(i) Context: Many students in Mary’s class read a very interesting book.

  I don’t think [anybody in John’s class] *also* read something interesting.

This sentence is grammatical, and it contains such a scope.
6.4.5  Split ‘only,’ non-split ‘just’ and modal scope relationships

Similarly to NPI-licensing, the negative component to only is the key to why only behaves similarly to negation when interacting with modals. If we theorize that it contains negation, then we have a reasonable explanation as to why it mirrors negation in regard to its scopal behavior. Below we return to the examples in (55) – (57), this time with the new proposed structures included:

(79) Negation (not)

a. James ought to not eat bread.  modal > negation
   [ought to1 [NEG [James t1 eat bread]]]

b. James needs to not eat bread.  modal > negation
   [[needs to]1 [NEG[James t1 eat bread]]]

c. James should not eat bread.  modal > negation
   [should1 [NEG [James t1 eat bread]]]

d. James may not eat bread.negation > modal49
   [NEG [James may eat bread]]

e. James can not eat bread.  negation > modal
   [NEG [James can eat bread]]

49 Note that while the structure for (79d), (79e), (80d), and (80e) are presented here as NEG/only > modal, the literature has well documented that with these modals, NEG > modal can also produce a modal > NEG interpretation. Why this is the case and exactly how this happens is unclear, but many researchers suspect something along the lines of modal raising to produce this second structure (see Cormack & Smith 2002, latridou & Zeijlstra 2013, and Homer 2015 among others).
(80) Exclusive only

a. James ought to only eat [bread].

[[ought to][[QUE bread][\lambda x.\neg James t₁ eat x]]]

b. James needs to only eat [bread].

[[needs to][[QUE bread][\lambda x.\neg James t₁ eat x]]]

c. James should only eat [bread].

[[should][[QUE bread][\lambda x.\neg James t₁ eat x]]]

d. James may only eat [bread].

[[QUE bread][\lambda x.\neg James should eat x]]

e. James can only eat [bread].

[[QUE bread][\lambda x.\neg James can eat x]]

(81) Exclusive just

a. James ought to just eat [bread].

[[ought to][just [James t₁ eat [bread]]]]

b. James needs to just eat [bread].

[[needs to][just [James t₁ eat [bread]]]]

c. James should just eat [bread].

[[should][just [James t₁ eat [bread]]]]

d. James may just eat [bread].

[[may][just [James t₁ eat [bread]]]]

e. James can just eat [bread].

[[can][just [James t₁ eat [bread]]]]
As for why negation takes scope over some modals and scope under other modals, that is a topic outside of the scope of this manuscript. We once again refer the reader to Cormack & Smith (2002), Iatridou & Zeijlstra (2013), and Homer (2015) for their theories on this matter. The proposed split account of *only* simply follows the same rules as standard negation, since it contains negation. It appears that the additional QUE-phrase has no influence on the scope effects. *Just*, however, consistently has the modal scoping over the sentential operator since it does not contain negation.

6.5 Issues with the current theory: SMCs

As mentioned before, this theory is simply a first attempt at accounting for the observed NPI and modal/scope differences between *only* and *just*. While it’s successful in capturing these variations, there are other areas where it has substantial drawbacks. The two most prominent places both relate to SMCs. In 6.4.2 – 6.4.5, I outlined why it was important to have negation scope over QUE in order to accurately predict the observed NPI licensing and modal/scope interaction behaviors. Unfortunately, however, there is a clear disadvantage to using this particular scope configuration.

When QUE is moved outside of the scope of negation, we get a different structure for SMCs than the one proposed by vF&I. In and of itself, this not an issue; the problem occurs when we look at what the new theory predicts for the presuppositions and assertions. To compare, vF&I’s structure, presupposition and assertion are below as compared with my structure, presupposition, and assertion:\n
---

50 Both of the presuppositions use the weak presupposition: \( \exists x (P(x) = 1) \).
A comparison of presuppositions and assertions for SMCs

a. vF&I split account:

To get good cheese you NEG have to QUE [go to the North End]

P: In all worlds where you get good cheese, you have to do something.
A: In some of the worlds where you get good cheese, you don’t have to go anywhere other than the North End.

b. My split account:

To get good cheese, QUE [go to the North End] NEG you have to t

P: There is something in all the worlds where you get good cheese such that you have to do it.
A: With the exception of the North End, there is no such place that you go in all the worlds where you get good cheese.

Unsurprisingly, the presuppositions and assertions are both different. Now that the QUE (with its existential modifier component) is scoping over the negation, we end up back at the Prejacent Problem, even if we utilize the weaker presupposition. We end up with a particular thing which must be done in all the worlds where you get good cheese. This certainly isn’t true, and in this circumstance, vF&I’s split only is more accurate. The assertion that we create is different, but doesn’t seem incorrect: excepting the North End, there isn’t a particular place that you must go in all the worlds where you get good cheese. Since the North End is minimally sufficient, you must minimally go there to get good cheese (but you could go somewhere else that is more difficult to get to).

The other issue for the theory in regard to SMCs is that its two sets of different structures and semantics fail to account for the observation that just is able to participate in SMCs:
(83) To get good cheese, you just have to go to the North End!

The reason that vF&I (2007) originally proposed the split account of only was to account for the Prejacent Problem and if we're assuming a split structure for only, but a traditional non-split structure for just, we have no way of solving this issue for just. SMCs containing just, that are completely acceptable and interpretable, will end up having the same incorrect presuppositions (in this case: "In all worlds where you get good cheese, you have to go to the North End.").

6.6 Areas of future research

While there are many potential areas of future research, the most enticing is that of the scope/modal interaction relationships. As mentioned in the Methodology chapter, I included two exclusive fillers per list to run a preliminary analysis on. I checked for a correlation between these sentence ratings and the NPI sentence ratings to see if their judgments patterned similarly. The reader will recall that this directly addresses my third experiment prediction (participants who, on average, judge the JUST versions of the NPI sentences to be more acceptable will also find the JUST versions of the exclusive fillers to be more acceptable). This correlation was done by-participant using Pearson's product-moment correlation, where each individual participant contributed a mean rating for their JUST + NPI sentences (4 sentences total) and their mean rating for JUST + modal sentences (1 sentence total). The prediction expected a significant positive correlation, but the results were actually a non-significant negative correlation ($r = -0.154$, $p = 0.15$).

While the data and analysis unfortunately do not support Prediction 3, it is not my belief that this prediction should be entirely abandoned. As previously mentioned, the exclusive fillers were included as the beginning of a pursuit on the complicated scope interactions between just and modals. Each participant only saw two of these exclusive fillers (one ONLY version and one JUST
version), meaning the sample size was much, much smaller than the experimental sample size for NPIs. Also, since these were designated as fillers, no special training on these modal sentences was given (outside of how to cope with short story fillers). Between these factors, it’s quite possible that the data do not accurately represent the participants’ opinions of JUST + modal sentences. A similar experiment to my NPI experiment could be conducted which focuses specifically on these modal/scope interactions. The findings could provide support for my theory that only behaves like negation (due to their similarities in the environment of modals and NPIs), or could steer the theory into a different direction.

7 Conclusion

When I first decided to create and administrate an experiment on the relative acceptability of just and only in sentences with NPIs, I had two goals: 1) to discover if my intuitions about these types of sentences matched the intuitions of average native American English speakers, and 2) to determine whether the experimental data supported a theory where just and only had different structures and/or semantics. I was able to meet both of these goals.

My theory on just and only was based upon intuitive judgments that just was not able to license weak NPIs in sentences parallel to those where only could license them. Furthermore, both only and just versions were judged to be completely grammatically acceptable without NPIs. The statistics from the NPI experiment support these judgments. When analyzing the data in a 2x2 model (JUST/ONLY and NPI/no NPI), the mean ratings were as follows: ONLY + no NPI: M = 5.16 SD = 1.12, JUST + no NPI: M = 4.82 SD = 1.23, ONLY + NPI: M = 4.04 SD = 1.59, JUST + NPI: M = 3.15 SD = 1.68. I found a significant main effect for version (adjusting from JUST to ONLY: p < 0.001) and a significant main effect for NPI category (adjusting from JUST + no NPI to JUST + NPI: p
< 0.001), indicating a high degree of confidence that these predictors (version and NPI category) are responsible for the difference in means. The Tukey Test revealed no significant difference between JUST + no NPI and ONLY + no NPI, which aligns with the expectation that participants would find these sentences more or less equally acceptable. A significant difference between JUST + no NPI and JUST + NPI, however, was demonstrated (p < 0.001). This was also as anticipated (falling under the prediction that participants would judge the JUST + NPI sentences to be less acceptable than the JUST + no NPI sentences).

The data both support my intuitions about the acceptability of exclusive + NPI sentences and also strongly endorse a theory where just and only are not treated the same. While they do not directly support or refute my proposed theory regarding the structures and semantics of these exclusives, they certainly discourage a theory that conflates the two. Only's ability to license NPIs has been challenging to account for in the prior literature (von Fintel 1999) due to its inability to create classic DE environments. Utilizing any of the previous explanations for only produces incorrect predictions for just if we assume an identical structure and semantics as only. In my theory, I posit that 1) just has the same structure and semantics that has classically been assigned to only under a Horn/Rooth account, 2) only has a split NEG + EXC structure, and 3) NPI licensing is determined by DE (rather than SDE) environments. This is certainly not the only approach and, indeed, this theory has its own issues. The important thing moving forward is that any semantic account for only and just must be able to account for these acceptability differences, which are now backed up by experimental data.

There is still much work to be done in regard to only and just. Modal/scope interaction sentences were only lightly touched upon in the experiment as filler items, and the preliminary statistics did not show a strong correlation between NPI acceptability and modal/scope interpretation acceptability for the sentences including just. Since the data set was so small, it is
unclear whether my own intuitions do not match the intuitions of a larger population (perhaps meaning that the modal/scope interaction and NPI licensing observations are unrelated) or if these particular sentences were suboptimal in some way. Either way, a similar experiment on the acceptability of modal/scope interpretations of sentences with negation, *only*, and *just* could prove as enlightening as this experiment. On a broader view, there are still many perplexing behaviors of *just* that are waiting to be explored, such as its unacceptability in phrase-initial/sentence-initial positions for many English speakers\textsuperscript{51} and its ability to equally participate in SMCs. It is my hope that my findings outlined in this manuscript will contribute to a growing discussion on *just* and how it truly is a different beast than *only*.

\textsuperscript{51} Except in Minimal Sufficiency Readings (Grotz 2012, Coppock and Beaver 2014, Coppock and Lindahl 2014), which seem to be acceptable to everyone:

(i) Just the thought of him sends shivers down my spine (Coppock and Lindahl 2014)
APPENDICES

Appendix A: Alternative Semantics applied to "John only invited [Beth]$_F$ to the movie"

Application of the formula in (15) to “John only invited [Beth]$_F$ to the movie,”

\[
\text{(15)} \quad \llbracket \text{only}_C S \rrbracket^w \text{ is defined only if (i.e. presupposes that) } \llbracket S \rrbracket^w = 1.
\]

If defined, \(\llbracket \text{only}_C S \rrbracket^w = 1\) iff \(\forall S' (S' \in C) \& S \not\propto S' \rightarrow \llbracket S' \rrbracket^w = 0\)\(^{52}\)

Sentence of the structure only + S: “John only invited [Beth]$_F$ to the movie”

Individuals in the domain: John, Beth, Eli, Daryl, Lily

\[S = \text{"John invited [Beth]$_F$ to the movie"}\]

\[C = \{ \text{"John invited Eli to the movie"}, \text{"John invited Daryl to the movie"}, \text{"John invited Lily to the movie"} \}\]

Formula for only + S:

\[\llbracket \text{only}_C S \rrbracket^w \text{ is defined only if (i.e. presupposes that) } \llbracket S \rrbracket^w = 1.\]

If defined, \(\llbracket \text{only}_C S \rrbracket^w = 1\) iff \(\forall S' (S' \in C) \& S \not\propto S' \rightarrow \llbracket S' \rrbracket^w = 0\)

Application of formula to the only + S sentence:

\(^{52}\) The assertion could also be written as the following:

\((i) \quad \text{If defined, } \llbracket \text{only}_C S \rrbracket^w = 1 \iff \exists S' \ (S' \in C) \& S \not\propto S' \& \llbracket S' \rrbracket^w = 0\]

\((i)\) is equivalent to "If defined, \(\llbracket \text{only}_C S \rrbracket^w = 1\) iff \(\forall S' (S' \in C) \& S \not\propto S' \rightarrow \llbracket S' \rrbracket^w = 0"
Presupposition:

⟦John only invited [Beth]ₚ to the movie⟧ᵩ is defined only if (i.e. presupposes that) ⟦John invited [Beth]ₚ to the movie⟧ᵩ = 1.

Assertion:

If defined, ⟦John only invited [Beth]ₚ to the movie⟧ᵩ = 1 iff 

∀S′(S′ ∈ {"John invited Eli to the movie", "John invited Daryl to the movie", "John invited Lily to the movie"})

& "John invited Beth to the movie" ⇒ S′ → ⟦S′⟧ᵩ = 0

Test for all S′:

1. S′ = "John invited Eli to the movie:"

   S′ ∈ {"John invited Eli to the movie", "John invited Daryl to the movie", "John invited Lily to the movie"} = 1

   S ⇒ S′ = 1

   ∴ ⟦John invited Eli to the movie⟧ᵩ = 0

2. S′ = "John invited Daryl to the movie:"

   S′ ∈ {"John invited Eli to the movie", "John invited Daryl to the movie", "John invited Lily to the movie"} = 1

   S ⇒ S′ = 1

   ∴ ⟦John invited Daryl to the movie⟧ᵩ = 0
S′ ∈ \{"John invited Eli to the movie", "John invited Daryl to the movie", "John invited Lily to the movie"\} = 1
S ⊬ S′ = 1
∴ [John invited Daryl to the movie]^w = 0

3. S′ = “John invited Lily to the movie:"

S′ ∈ \{"John invited Eli to the movie", "John invited Daryl to the movie", "John invited Lily to the movie"\} = 1
S ⊬ S′ = 1
∴ [John invited Lily to the movie]^w = 0

4. S′ = “John invited Beth to the movie:"

S′ ∈ \{"John invited Eli to the movie", "John invited Daryl to the movie", "John invited Lily to the movie"\} = 0
S ⊬ S′ = 0
∴ It is not the case that [John invited Beth to the movie]^w = 0

To return to the claim that negating a sentence containing only also negates the assertion, but not the presupposition, below we negate the previous example:

\text{(28)} \quad \text{“John didn’t only invite [Beth] to the movie”}

S = “John invited Beth to the movie"
\[ C = \left\{ "John invited Eli to the movie" \right\} \]

\[ \neg [\text{only}_C S]_w \text{ is defined only if (i.e. presupposes that) } [S]_w = 1. \]

If defined, \[ \neg [\text{only}_C S]_w = 1 \text{ iff } \neg \forall S'(S' \in C) \& S \not\rightarrow S' \rightarrow [S']_w = 0 \]

P: John invited Beth to the movie

A: \[ \neg \forall S (S \in C \& S \not\rightarrow S' \rightarrow [S']_w = 0 \]

For (28) to be true, not only must the presupposition "John invited Beth to the movie" be true, but there must be a sentence in the set of C that is also true. Meaning that \[ [\text{John invited Beth to the movie}]_w \] must be true, and at least one of \[ [\text{John invited Eli to the movie}]_w \], \[ [\text{John invited Daryl to the movie}]_w \], and \[ [\text{John invited Lily to the movie}]_w \].
Appendix B: Semantic derivation ONLY + [Beth] 

Derivation of (69):

\[\text{[[QUE}_D]\text{]}^w(x)(P)\text{ is defined only if (i.e. presupposes that) } P(x) = 0 \text{ in } w.\]

If defined, \[\text{[[QUE}_D]\text{]}^w(x)(P) = 1 \text{ iff } \forall y(y \in D \& y \neq x \rightarrow P(y) = 1 \text{ in } w)\]

D = Set of alternatives to the focus associate

j = \[\text{[John]}\]

b = \[\text{[Beth]}\]

Step 1: functional application and lambda conversion

\[\text{[1]} = \text{[2]}([3])\]

\[= \text{[4]}([\text{[Beth]}])([3])\]

\[= \text{[[QUE}_b]\text{]}^w(b) ([3])\]

\[\text{[[QUE}_b]\text{]}^w(b) ([3])\text{ is defined only if (i.e. presupposes that) } [[3]](x) = 0 \text{ in } w.\]

If defined, \[\text{[[QUE}_b]\text{]}^w(b) ([3]) = 1 \text{ iff } \forall y(y \in D \& y \neq b \rightarrow [[3]](y) = 1 \text{ in } w)\]

Step 2: Define the presupposition

\[\text{[John only likes [Beth]_F]}\text{ is defined only if } [[3]](b) = 0 \text{ in } w.\]

\[[[3]](b) = [\lambda x.[5]](b)\]

\[= [\lambda x. \neg [[6]]](b)\]

\[= [\lambda x. \neg j \text{ likes } x](b)\]

\[= \text{ It is not the case that } j \text{ likes } b \text{ in } w.\]

\[\text{[John only likes [Beth]_F]} \text{ is defined only if it is not the case that } j \text{ likes } b = 0 \text{ in } w\]
[John only likes [Beth]_F] is defined only if j likes b = 1 in w

**Step 3: Define the assertion**

If defined, [John only likes [Beth]_F]_w = 1 iff ∀y [y ∈ D & b ≠ x → [3]_w (y) = 1 in w]

∀y [y ∈ D & y ≠ b → [3]_w (y) = 1 in w]

∀y [y ∈ D & y ≠ b → [λx. ¬[6]_w (y) = 1 in w]

∀y [y ∈ D & y ≠ b → [λx. ¬j likes x](y) = 1 in w]

∀y [y ∈ D & y ≠ b → It is not the case that j likes y= 1 in w]

**Breakdown with Individuals:**

Set of individuals in the domain = {John, Mary, Beth, George} or {j, m, b, g}

Focus associate = Beth, or b

D = {John, Mary, George} or {j, m, g}

[John only likes [Beth]_F]_w is defined only if John likes Beth is true (Presupposition)

If defined, [John only likes [Beth]_F]_w = 1 iff ∀y [y ∈ D & y ≠ b → It is not the case that John likes y= 1 in w] (Assertion)

∀y [y ∈ D & y ≠ b → It is not the case that j likes y= 1 in w]

∀y [y ∈ {John, Mary, George} & y ≠ b → It is not the case that John likes y= 1 in w]
\[ y_1 = j \]
\[ y \in \{j, m, g\} = 1 \]
\[ y \neq b = 1 \]
\[ \therefore \text{It is not the case that } j \text{ likes } j = 1 \text{ in } w \]

\[ y_2 = m \]
\[ y \in \{j, m, g\} = 1 \]
\[ y \neq b = 1 \]
\[ \therefore \text{It is not the case that } j \text{ likes } m = 1 \text{ in } w \]

\[ y_3 = g \]
\[ y \in \{j, m, g\} = 1 \]
\[ y \neq b = 1 \]
\[ \therefore \text{It is not the case that } j \text{ likes } g = 1 \text{ in } w \]

\[ y_4 = b \]
\[ y \in \{j, m, g\} = 0 \]
\[ y \neq b = 0 \]
\[ \therefore \text{It is not the case that } j \text{ likes } b = 0 \text{ in } w \]

The semantics correctly predicts that \[[\text{John only likes } [\text{Beth}]_f]\] is defined only if John likes Beth is true and, if defined, John likes no one else besides Beth in the context.
Appendix C: Semantic derivation of JUST + [Beth]f

Derivation of (76):

$[[\text{just}_C S]]_w$ is defined only if (i.e. presupposes that) $[[S]]_w = 1$.

If defined, $[[\text{just}_C S]]_w = 1$ iff $\forall S'(S' \in C) & S \not\rightarrow S' \rightarrow [[S']]_w = 0$

$C =$ Set of alternatives to the prejacent

$S =$ the prejacent

**Step 1: functional application and lambda conversion**

$[[1]] = [[2]]([[3]])$

$= [[\text{just}_C]]_w([[3]]_w)$

$= [[\text{just}_C]]_w([[3]]_w)$ is defined only if (i.e. presupposes that) $[[3]]_w = 1$.

If defined, $[[\text{just}_C]]_w([[3]]_w) = 1$ iff $\forall S'(S' \in C) & S \not\rightarrow S' \rightarrow [[S']]_w = 0$

**Step 2: Define the presupposition:**

$[[\text{John just likes [Beth]f}]]_w$ is defined only if (i.e. presupposes that) $[[3]]_w = 1$

$[[3]]_w = [[\text{John likes Beth}]]_w$

$[[\text{John just likes [Beth]f}]]_w$ is defined only if (i.e. presupposes that) $[[\text{John likes Beth}]]_w = 1$

**Step 3: Define the assertion:**

If defined, $[[\text{John just likes [Beth]f}]]_w = 1$ iff $\forall S'(S' \in C) & (\"John likes Beth\" \not\leftrightarrow S') \rightarrow [[S']]_w = 0$

\[
\forall S'[(S \in C) & (\"John likes Beth\" \not\leftrightarrow S') \rightarrow [[S']]_w = 0]
\]

$\forall S'[(S \in C) & (j \text{ likes } b \not\leftrightarrow S') \rightarrow [[S']]_w = 0$
(75) **Breakdown with Individuals:**

Set of individuals in the domain = {John, Mary, Beth, George} or {j, m, b, g}

Focus associate = b

S = “John likes Beth”

\[ C = \{ "John likes John", "John likes Mary", "John likes George" \} \]

\[ \llbracket \text{John just likes } [\text{Beth}] \rrbracket \text{ is defined only in worlds where } j \text{ likes } b = 1 \text{ (Presupposition)} \]

If defined in a world \( w \), \( \llbracket \text{John just likes } [\text{Beth}] \rrbracket \) = 1 iff \( \forall S \in C \) & ("John likes Beth" \( \not\in \) S) \( \rightarrow \llbracket S \rrbracket_0 = 0 \) (Assertion)

1. \( S' = "\text{John likes John}" \)

\[ S' \in \{ "\text{John likes John}", "\text{John likes Mary}", "\text{John likes George}" \} = 1 \]

"John likes Beth" \( \not\in \) S' = 1

\( \therefore \llbracket \text{John likes John} \rrbracket_0 = 0 \)

2. \( S' = "\text{John likes Mary}" \)

\[ S' \in \{ "\text{John likes John}", "\text{John likes Mary}", "\text{John likes George}" \} = 1 \]

"John likes Beth" \( \not\in \) S' = 1

\( \therefore \llbracket \text{John likes Mary} \rrbracket_0 = 0 \)
3. $S' = "John likes George"$

$$S' \in \{ "John likes John" \} = 1$$

"John likes Beth" $\not\in S' = 1$

$\therefore \llbracket \text{John likes George} \rrbracket^w = 0$

4. $S' = "John likes Beth"$

$$S' \in \{ "John likes John" \} = 0$$

"John likes Beth" $\not\in S' = 0$

$\therefore \llbracket \text{John likes Beth} \rrbracket^w = 1$

The semantics correctly predicts that $\llbracket \text{John just likes [Beth]}_F \rrbracket^w$ is defined only if $\llbracket \text{John likes Beth} \rrbracket^w$ is true and, if defined, $\llbracket \text{John just likes [Beth]}_F \rrbracket^w$ is true if John likes no one else besides Beth.
Appendix D: Experimental sentences used in pilot

1A Jonathan doesn't drink BEER at his parties; he drinks WINE
1B Jonathan doesn’t drink BEER at any of his parties; he drinks WINE.
1C Jonathan only drinks BEER at any of his parties; he doesn't drink WINE.
1D Jonathan just drinks BEER at any of his parties; he doesn't drink WINE.

2A Mary doesn't TEXT her friends on weekends; she CALLS them instead.
2B Mary doesn’t ever TEXT her friends on weekends; she CALLS them instead.
2C Mary only ever TEXTS her friends on the weekends; she doesn’t CALL them.
2D Mary just ever TEXTS her friends on the weekends; she doesn’t CALL them.

3A That restaurant doesn’t serve SOUP with its entrees; it serves SALAD.
3B That restaurant doesn’t serve SOUP with any of its entrees; it serves SALAD.
3C That restaurant only serves SOUP with any of its entrees; it doesn’t serve SALAD.
3D That restaurant just serves SOUP with any of its entrees; it doesn't serve SALAD.

4A Catherine won’t WRITE the children’s book; she'll ILLUSTRATE it.
4B Catherine won’t ever WRITE the children’s book; she’ll ILLUSTRATE it.
4C Catherine will only ever WRITE the children’s book; she won’t ILLUSTRATE it.
4D Catherine will just ever WRITE the children’s book; she won’t ILLUSTRATE it.

5A Henry will not play soccer in MARCH this year; he will play in JUNE.
5B Henry will not play any soccer in MARCH this year; he will play in JUNE.
5C Henry will only play any soccer in MARCH this year; he won’t play in JUNE.
5D Henry will just play any soccer in MARCH this year; he won’t play in JUNE.

6A My sister’s husband doesn’t WALK on his treadmill; he always RUNS on it.
6B My sister’s husband doesn’t ever WALK on his treadmill; he always RUNS on it.
6C My sister’s husband only ever WALKS on his treadmill; he doesn’t RUN on it.
6D My sister’s husband just ever WALKS on his treadmill; he doesn’t RUN on it.

7A Nina doesn’t take classes at the UNIVERSITY; she goes to the COMMUNITY COLLEGE.
7B Nina doesn’t take any classes at the UNIVERSITY; she goes to the COMMUNITY COLLEGE.
7C Nina only takes any classes at the UNIVERSITY; she doesn’t go to the COMMUNITY COLLEGE.
7D Nina just takes any classes at the UNIVERSITY; she doesn’t go to the COMMUNITY COLLEGE.

8A Jacob’s cat doesn’t SCRATCH strangers that try to pet her; she BITES them.
8B Jacob’s cat doesn’t ever SCRATCH strangers that try to pet her; she BITES them.
8C Jacob’s cat only ever SCRATCHES strangers that try to pet her; she doesn’t BITE them.
8D Jacob’s cat just ever SCRATCHES strangers that try to pet her; she doesn’t BITE them.

9A Morgan doesn’t borrow clothes from SARAH; she borrows clothes from HELEN.
9B Morgan doesn’t borrow any clothes from SARAH; she borrows clothes from HELEN.
9C Morgan only borrows any clothes from SARAH; she doesn’t borrow clothes from HELEN.
9D Morgan just borrows any clothes from SARAH; she doesn’t borrow clothes from HELEN.

10A Scott doesn’t DOZE on the red-eye flights he books; he SLEEPS on them.
10B Scott doesn’t ever DOZE on the red-eye flights he books; he SLEEPS on them.
10C Scott only ever DOZES on the red-eye flights he books; he doesn’t SLEEP on them.
10D Scott just ever DOZES on the red-eye flights he books; he doesn’t SLEEP on them.

11A Ella doesn’t eat PANCAKES for her weekend breakfasts; she eats WAFFLES.
11B Ella doesn’t eat PANCAKES for any of her weekend breakfasts; she eats WAFFLES.
11C Ella only eats PANCAKES for any of her weekend breakfasts; she doesn’t eat WAFFLES.
11D Ella just eats PANCAKES for any of her weekend breakfasts; she doesn’t eat WAFFLES.

12A Sophia doesn’t STEAM the frozen dumplings she buys; she FRIES them.
12B Sophia doesn’t ever STEAM the frozen dumplings she buys; she FRIES them.
12C Sophia only ever STEAMS the frozen dumplings she buys; she doesn’t FRY them.
12D Sophia just ever STEAMS the frozen dumplings she buys; she doesn’t FRY them.
Appendix E: Final experiment fillers

21 filler pairs: (7/7/7)

7 modifier ("last"/"next") on NP

7 modifier on VP (adverbs)

7 Contrastive sentences (no negation)

(Pair total: 42 fillers)

12 Modal/Short Story sentences (including 3 JUST/ONLY Experimental Crossover)

(Short Story total: 12 fillers)

Total: 54 filler sentences

\[ \text{npMod: Modifier on an NP (last/next) - 7} \]

F1 (FIL-npMod-LAST)
F1A  * Josephine admires that OWEN took his dog on vacation with him summer; she doesn’t admire that DEREK also took his.
F1B  Josephine admires that OWEN took his dog on vacation with him last summer; she doesn’t admire that DEREK also took his.

F2 (FIL-npMod-LAST)
F2A  The tech representative tells me that JULIA worked night shifts this week; he didn’t tell me that HARVEY did, too.
F2B  The tech representative tells me that JULIA worked night shifts this last week; he didn’t tell me that HARVEY did, too.

F3 (FIL-npMod-LAST)
F3A  The teacher notices that ALFRED brought his tablet on the school trip; she doesn’t notice that JARED did, too.
F3B  The teacher notices that ALFRED brought his tablet on the last school trip; she doesn’t notice that JARED did, too.

F4 (FIL-npMod-LAST)
F4A  Milly is sad that the ELECTRIC BILL was lost in the mail on Tuesday; she isn’t sad that the WATER BILL was lost.
F4B  * Milly is sad that the ELECTRIC BILL was lost in the mail on last Tuesday; she isn’t sad that the WATER BILL was lost.

F5 (FIL-npMod-NEXT)
F5A  Natalie senses that her BROTHER will make milkshakes for the picnic; she doesn’t sense that her SISTER will.
F5B  Natalie senses that her BROTHER will make milkshakes for the next picnic; she doesn’t sense that her SISTER will.

F6 (FIL-npMod-NEXT)
F6A  Tim likes that the POPCORN will be served fresh at the movie showing; he doesn’t like that the NACHOS will be served fresh, too.
F6B  Tim likes that the POPCORN will be served fresh at the next movie showing; he doesn’t like that the NACHOS will be served fresh, too.

F7 (FIL-npMod-NEXT)
F7A  Penelope is certain that my AUNT has a recital in March; she’s not certain that my COUSIN has one.
F7B  * Penelope is certain that my AUNT has a recital in last March; she’s not certain that my COUSIN has one.

vpMod: Modifier on a VP (adverbs) – 7
F8 (FIL-vpMod)
F8A  The vice principal remarks that KENNETH gets high marks on his exams; she doesn’t remark that JESSE does, too.
F8B  * The vice principal remarks that KENNETH gets quickly high marks on his exams; she doesn’t remark that JESSE does, too.

F9 (FIL-vpMod)
F9A  My father demonstrates that ROBINS visit his birdhouse; he doesn’t demonstrate that HUMMINGBIRDS also visit it.
F9B  My father demonstrates that ROBINS regularly visit his birdhouse; he doesn’t demonstrate that HUMMINGBIRDS also visit it.

F10 (FIL-vpMod)
F10A  Louisa forgets that TIMOTHY will sing in the play; she doesn’t forget that LAWRENCE will sing in it, too.
F10B  * Louisa forgets that TIMOTHY will sing in the play yesterday; she doesn’t forget that LAWRENCE will sing in it, too.

F11 (FIL-vpMod)
F11A  The child is upset that ALPHONSE sipped her apple juice; she isn’t upset that WALLACE did.
F11B  The child is upset that ALPHONSE rudely sipped her apple juice; she isn’t upset that WALLACE did.

F12 (FIL-vpMod)
F12A  Carver concludes that his ASSISTANT plays tennis at the country club; he doesn’t conclude that his SECRETARY does.
F12B  Carver concludes that his ASSISTANT frequently plays tennis at the country club; he doesn’t conclude that his SECRETARY does.

F13 (FIL-vpMod)
F13A  Jen reads that BEARS catch fish at the river outside of town; she doesn’t read that OTTERS do, too.
F13B  Jen reads that BEARS patiently catch fish at the river outside of town; she doesn’t read that OTTERS do, too.

F14 (FIL-vpMod)
F14A  Darcy is surprised that her FATHER loved to build model airplanes; she isn’t surprised that her MOTHER did.
F14B  * Darcy is surprised that her FATHER loved to build model airplanes tomorrow; she isn’t surprised that her MOTHER did.

Contr: CONTRASTIVE (with degrees) - 7
F15 (FIL-ContrReally)
F15A  My piano teacher informs me that SPINACH is the healthiest food; my physical therapist informs me that CARROTS are.
F15B  My piano teacher informs me that SPINACH is really the healthiest food; my physical therapist informs me that CARROTS are.

F16 (FIL-ContrKindOf)
F16A  Linda complains that her MOTHER-IN-LAW listens to country music; Jimmy complains that his FATHER does.
F16B  Linda complains that her MOTHER-IN-LAW kind of listens to country music; Jimmy complains that his FATHER does.

F17 (FIL-ContrALittle)
F17A  Bill confides that GEORGIA’S parents hated her kindergarten teacher; Kyle confides that TABITHA’S parents did.
F17B  * Bill confides that GEORGIA’S parents a little hated her kindergarten teacher; Kyle confides that TABITHA’S parents did.

F18 (FIL-ContrReally)
F18A  Timothy assumes that JOSEPH wanted to buy popsicles for dessert; Anthony assumes that SERENA wanted to buy them herself.
F18B  Timothy assumes that JOSEPH really wanted to buy popsicles for dessert; Anthony assumes that SERENA wanted to buy them herself.

F19 (FIL-ContrKindOf)
F19A  My best friend writes that her COWORKER annoys her at her job; my brother writes that his SUPERVISOR does.
F19B  My best friend writes that her COWORKER kind of annoys her at her job; my brother writes that his SUPERVISOR does.

F20 (FIL-ContrALittle)
F20A  David tells me that GEOLOGY is difficult to teach kids at summer camp; Leigh tells me that PAINTING is, instead.
F20B  David tells me that GEOLOGY is a little difficult to teach kids at summer camp; Leigh tells me that PAINTING is, instead.
F21 (FIL-ContrReally)
F21A Gilbert brags that his GRANDMOTHER excels at cribbage; Felicity brags that her HUSBAND does.
F21B * Gilbert brags that his GRANDMOTHER excels really at cribbage; Felicity brags that her HUSBAND does.

Short Story Questions: Includes Modals (12 total, no pairs)
Modal count:
   May: 3
   Must: 3
   Should 3
   Can 4

FIL22 (13: may_Pizza)
Situation: Nick is a 10-year-old kid who aced his math exam in school today. His mother will order him a pizza tonight to celebrate. Nick asks if they can also order some breadsticks, but his mother thinks this is too much unhealthy food.

Is the following a sentence that is both acceptable and true, given this situation?
(Note: participants will only see one of the following two options, dependent on list)
13-ONLY Nick may only eat PIZZA for dinner tonight; he may not have BREADSTICKS as well.
13-JUST Nick may just eat PIZZA for dinner tonight; he may not have BREADSTICKS as well.

FIL23 (14: may_Van)
Situation: James is a teenager who recently got his driver’s license. He doesn’t have his own car, but his family owns three vehicles: a van, a sports car, and a truck. Since James is a new driver, his parents stipulate that he is limited to driving the van when he drives around town alone.

Is the following a sentence that is both acceptable and true, given this situation?
(Note: participants will only see one of the following two options, dependent on list)
14-ONLY James may only drive the VAN without his parents; he may not drive the SPORTS CAR.
14-JUST James may just drive the VAN without his parents; he may not drive the SPORTS CAR.

FIL24 (15: may_Honors)
Situation: Belinda is a student in the honors program at her high school. To ensure fair treatment of all the honors students, since honors courses are in high demand, the school enforces a limit of one honors course per student each semester. Belinda chooses Honors History as her one honors course.

Is the following a sentence that is both acceptable and true, given this situation?
(Note: participants will only see one of the following two options, dependent on list)
15-ONLY Belinda may only take honors HISTORY this semester; she may not take honors PHYSICS.
15-JUST Belinda may just take honors HISTORY this semester; she may not take honors PHYSICS.
F25 (FIL-MODAL_MUSTgarden) #
**Situation:** Terrance works at a Bed and Breakfast where he does various tasks to maintain the house and grounds. His employer gives him a list of things that must be done this week, which includes weeding the garden, cleaning the windows, and vacuuming the rooms. Today is sunny, but the rest of the days this week will be rainy, so his employer tells him it’s important that the gardening be done today.

Is the following a sentence that is **both acceptable and true**, given this situation?
#Terrance must clean INSIDE today; he doesn’t have to work OUTSIDE.

F26 (FIL-MODAL_MUSTexams)
**Situation:** A middle school teacher recently gave final exams for her students. She has two deadlines that she must meet before wrapping up her semester. The first deadline is completing her grading by tomorrow. The second deadline is submitting her grades to her principal by next week.

Is the following a sentence that is **both acceptable and true**, given this situation?
The teacher must grade the final exams by TOMORROW; she doesn’t have to submit grades until NEXT WEEK.

F27 (FIL-MODAL_MUSTdog)
**Situation:** Clark is training the family dog Martha using positive reinforcement in the form of treats. When he gives a command, he gives the dog a treat if she obeys him immediately. Clark’s two kids are not participating in the training, and they give her treats even when she doesn’t obey a command.

Is the following a sentence that is **both acceptable and true**, given this situation?
The family dog must quickly obey CLARK to get treats; she doesn’t have to obey CLARK’S KIDS to get treats.

F28 (FIL-MODAL_SHOULDcake)
**Situation:** Madeline is organizing a party for her daughter’s birthday today. Since she is very busy, she made a list of all the things she needed to do, and did one thing a day from the list. Unfortunately, she did not take into account the preparation time of the birthday cake at the local bakery. She picked up the ice cream from the store yesterday and ordered the cake from the bakery today, but the baker tells her that the cake won’t be ready until tomorrow.

Is the following a sentence that is **both acceptable and true**, given this situation?
The cake should have been ordered YESTERDAY; the ice cream didn’t need to be picked up until TODAY.

F29 (FIL-MODAL_SHOULDvendingmachine)
**Situation:** The vending machine at Larry’s work is constantly malfunctioning. Several employees have gotten frustrated with it and have resorted to hitting it to get their purchases. The office has cautioned its workers to not do anything more than gently tap the machine. Today, Larry used the vending machine and his bag of chips got stuck.

Is the following a sentence that is **both acceptable and true**, given this situation?
#Larry should roughly HIT the vending machine; he shouldn’t carefully TAP it.

F30 (FIL-MODAL_SHOULDgirls scout) #
**Situation:** Bill brought his daughter to work today because she’s a Girl Scout who’s trying to sell boxes of cookies. He doesn’t think that his coworkers at the office will want to buy any boxes, so he emphasizes that she should be extremely persistent.

**Is the following a sentence that is both acceptable and true, given this situation?**
#The Girl Scout should ask the office workers if they want to buy cookies ONE time; she doesn’t need to ask MANY times.

F31 (FIL-MODAL_CANlibrary)
**Situation:** William likes to go to the library to study and he likes to listen to music while he’s studying. The library he visits allows this, but under the condition that all visitors use headphones if they're going to listen to anything.

**Is the following a sentence that is both acceptable and true, given this situation?**
At the library, William can quietly listen to his music with HEADPHONES; he can’t use his SPEAKERS.

F32 (FIL-MODAL_CANlawyer)
**Situation:** Hubert is an assistant for a successful lawyer at the local law firm. An important client of the lawyer’s wants a meeting today, but Hubert tells her that the lawyer’s schedule is completely booked. He offers to schedule the meeting for tomorrow instead.

**Is the following a sentence that is both acceptable and true, given this situation?**
The lawyer can meet with his important client TOMORROW; he can’t meet with her TODAY.

F33 (FIL-MODAL_CANdrycleaners)
**Situation:** Lewis dropped some clothes off at the dry cleaners yesterday. When he was asked whether he could come and pick them up the next day, he told them that he was too busy, but could pick them up the day after.

**Is the following a sentence that is both acceptable and true, given this situation?**
# Lewis can pick up the clothes from the dry cleaners TODAY; he can’t do it TOMORROW.

F34 (FIL-MODAL_CAN)
**Situation:** Howard has wanted to vacation in Jamaica for the past three years. He's been saving up money from his job and has finally collected enough to visit in the coming spring. He won’t be able to go this coming winter due to his busy work schedule.

**Is the following a sentence that is both acceptable and true, given this situation?**
Howard can visit Jamaica in the SPRING; he isn’t able to go in the WINTER.
Appendix F: Experimental sentences for experiment

- Each participant sees 24 experimental items (4 pairs for *only*, 4 pairs for *just*, and 4 pairs for negation)
- Part A: Sentence without NPI
- Part B: Sentence with NPI

12 Experimental Sentences with 3 versions each

Key differences: added an embedded clause, the focused element has stress on the last syllable,

strived to use a small, high-frequency, non-contrastive verb in main clause

1: any_Parties

1A-NEG Wendy doesn’t think that BERNARD ruins her parties; she thinks that KATHY ruins them.

1A-ONLY Wendy only thinks that BERNARD ruins her parties; she doesn’t think that KATHY ruins them.

1A-JUST Wendy just thinks that BERNARD ruins her parties; she doesn’t think that KATHY ruins them.

1B-NEG Wendy doesn’t think that BERNARD ruins any of her parties; she thinks that KATHY ruins them.

1B-ONLY Wendy only thinks that BERNARD ruins any of her parties; she doesn’t think that KATHY ruins them.

1B-JUST Wendy just thinks that BERNARD ruins any of her parties; she doesn’t think that KATHY ruins them.

2: ever_SwedishFriends

2A-NEG John doesn’t know that JEROME visited our friends in Sweden; he knows that MARY visited them.

2A-ONLY John only knows that JEROME visited our friends in Sweden; he doesn’t know that MARY visited them.

2A-JUST John just knows that JEROME visited our friends in Sweden; he doesn’t know that MARY visited them.

2B-NEG John doesn’t know that JEROME ever visited our friends in Sweden; he knows that MARY visited them.
2B-ONLY  John only knows that JEROME ever visited our friends in Sweden; he doesn’t know that MARY visited them.

2B-JUST  John just knows that JEROME ever visited our friends in Sweden; he doesn’t know that MARY visited them.

3: any_Soup
3A-NEG  Andrew doesn’t believe that SUZANNE ordered soup at lunch; he believes that GREG did.

3A-ONLY  Andrew only believes that SUZANNE ordered soup at lunch; he doesn’t believe that GREG did.

3A-JUST  Andrew just believes that SUZANNE ordered soup at lunch; he doesn’t believe that GREG did.

3B-NEG  Andrew doesn’t believe that SUZANNE ordered any soup at lunch; he believes that GREG did.

3B-ONLY  Andrew only believes that SUZANNE ordered any soup at lunch; he doesn’t believe that GREG did.

3B-JUST  Andrew just believes that SUZANNE ordered any soup at lunch; he doesn’t believe that GREG did.

4: ever_Champagne
4A-NEG  The renters aren’t concerned that the CHAMPAGNE spilled on the carpet; they’re concerned that the BEER spilled.

4A-ONLY  The renters are only concerned that the CHAMPAGNE spilled on the carpet; they aren’t concerned that the BEER spilled.

4A-JUST  The renters are just concerned that the CHAMPAGNE spilled on the carpet; they aren’t concerned that the BEER spilled.

4B-NEG  The renters aren’t concerned that the CHAMPAGNE ever spilled on the carpet; they’re concerned that the BEER spilled.

4B-ONLY  The renters are only concerned that the CHAMPAGNE ever spilled on the carpet; they aren’t concerned that the BEER spilled.

4B-JUST  The renters are just concerned that the CHAMPAGNE ever spilled on the carpet; they aren’t concerned that the BEER spilled.

5: any_Photographs
5A-NEG  Ethan doesn’t want DENISE to meet his relatives; he wants RICHARD to meet them.
5A-ONLY Ethan only wants DENISE to meet his relatives; he doesn't want RICHARD to meet them.

5A-JUST Ethan just wants DENISE to meet his relatives; he doesn't want RICHARD to meet them.

5B-NEG Ethan doesn't want DENISE to meet any of his relatives; he wants RICHARD to meet them.

5B-ONLY Ethan only wants DENISE to meet any of his relatives; he doesn't want RICHARD to meet them.

5B-JUST Ethan just wants DENISE to meet any of his relatives; he doesn't want RICHARD to meet them.

6: ever_Retire

6A-NEG Our boss doesn't hope that ELAINE volunteers to transfer; he hopes that CARRIE volunteers.

6A-ONLY Our boss only hopes that ELAINE volunteers to transfer; he doesn't hope that CARRIE volunteers.

6A-JUST Our boss just hopes that ELAINE volunteers to transfer; he doesn't hope that CARRIE volunteers.

6B-NEG Our boss doesn't hope that ELAINE ever volunteers to transfer; he hopes that CARRIE volunteers.

6B-ONLY Our boss only hopes that ELAINE ever volunteers to transfer; he doesn't hope that CARRIE volunteers.

6B-JUST Our boss just hopes that ELAINE ever volunteers to transfer; he doesn't hope that CARRIE volunteers.

7: any_Weight-training

7A-NEG The doctor doesn't recommend that JAMAL start weight-training; he recommends that LAURA start.

7A-ONLY The doctor only recommends that JAMAL start weight-training; he doesn’t recommend that LAURA start.

7A-JUST The doctor just recommends that JAMAL start weight-training; he doesn’t recommend that LAURA start.

7B-NEG The doctor doesn’t recommend that JAMAL start any weight-training; he recommends that LAURA start.
7B-ONLY  The doctor only recommends that JAMAL start any weight-training; he doesn’t recommend that LAURA start.

7B-JUST  The doctor just recommends that JAMAL start any weight-training; he doesn’t recommend that LAURA start.

8: ever_SportsCar

8A-NEG  The rich couple don’t claim that the CHAUFFEUR dented their sports car; they claim that the VALET did.

8A-ONLY  The rich couple only claim that the CHAUFFEUR dented their sports car; they don’t claim that the VALET did.

8A-JUST  The rich couple just claim that the CHAUFFEUR dented their sports car; they don’t claim that the VALET did.

8B-NEG  The rich couple don’t claim that the CHAUFFEUR ever dented their sports car; they claim that the VALET did.

8B-ONLY  The rich couple only claim that the CHAUFFEUR ever dented their sports car; they don’t claim that the VALET did.

8B-JUST  The rich couple just claim that the CHAUFFEUR ever dented their sports car; they don’t claim that the VALET did.

9: any_Movies

9A-NEG  The film critic doesn’t say that JOANNE borrowed his movies; he says that WILBUR borrowed them.

9A-ONLY  The film critic only says that JOANNE borrowed his movies; he doesn’t say that WILBUR borrowed them.

9A-JUST  The film critic just says that JOANNE borrowed his movies; he doesn’t say that WILBUR borrowed them.

9B-NEG  The film critic doesn’t say that JOANNE borrowed any of his movies; he says that WILBUR borrowed them.

9B-ONLY  The film critic only says that JOANNE borrowed any of his movies; he doesn’t say that WILBUR borrowed them.

9B-JUST  The film critic just says that JOANNE borrowed any of his movies; he doesn’t say that WILBUR borrowed them.
10: ever_Recitals

10A-NEG  My brother doesn’t recall that EILEEN slept through our cousin’s recitals; he recalls that DEREK slept through them.

10A-ONLY  My brother only recalls that EILEEN slept through our cousin’s recitals; he doesn’t recall that DEREK slept through them.

10A-JUST  My brother just recalls that EILEEN slept through our cousin’s recitals; he doesn’t recall that DEREK slept through them.

10B-NEG  My brother doesn’t recall that EILEEN ever slept through our cousin’s recitals; he recalls that DEREK slept through them.

10B-ONLY  My brother only recalls that EILEEN ever slept through our cousin’s recitals; he doesn’t recall that DEREK slept through them.

10B-JUST  My brother just recalls that EILEEN ever slept through our cousin's recitals; he doesn’t recall that DEREK slept through them.

11: any_Coffee

11A-NEG  My husband isn’t convinced that YVONNE takes milk in her coffee; he’s convinced that RUTH does.

11A-ONLY  My husband is only convinced that YVONNE takes milk in her coffee; he’s not convinced that RUTH does.

11A-JUST  My husband is just convinced that YVONNE takes milk in her coffee; he’s not convinced that RUTH does.

11B-NEG  My husband isn’t convinced that YVONNE takes any milk in her coffee; he’s convinced that RUTH does.

11B-ONLY  My husband is only convinced that YVONNE takes any milk in her coffee; he’s not convinced that RUTH does.

11B-JUST  My husband is just convinced that YVONNE takes any milk in her coffee; he’s not convinced that RUTH does.

12: ever_Desserts

12A-NEG  The chef doesn’t admit that the DESSERTS were served late; she admits that the APPETIZERS were.

12A-ONLY  The chef only admits that the DESSERTS were served late; she doesn’t admit that the APPETIZERS were.
The chef just admits that the DESSERTS were served late; she doesn’t admit that the APPETIZERS were.

The chef doesn’t admit that the DESSERTS were ever served late; she admits that the APPETIZERS were.

The chef only admits that the DESSERTS were ever served late; she doesn’t admit that the APPETIZERS were.

The chef just admits that the DESSERTS were ever served late; she doesn’t admit that the APPETIZERS were.
CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Title of Research Study: Judging variations of English sentences in Mechanical Turk

Principal Investigator: Tally Callahan (M.A., M.Phil., CUNY Graduate Center)
Ph.D. Student (Linguistics)

Faculty Advisor: Janet Dean Fodor (Ph.D., Massachusetts Institute of Technology)
Distinguished Professor

My name is Tally Callahan and I am a graduate student in the Ph.D. Program in Linguistics at the Graduate Center of the City University of New York. I am interested in how native English speakers judge the acceptability of similar sentences. You are being asked to participate in a research study because you're a native speaker of English and grew up speaking English in the United States. You are one of approximately 90 people to participate in this study. **Though there will be different versions of this survey, you only qualify for completing it once.**
Purpose:
The purpose of this research study is to examine how different native speakers of American English judge variations of English sentences. It will increase our understanding of how they process different types of sentences.

Procedures:
If you volunteer to participate in this research study, we will ask you to do the following:

- You will be presented with some sentences to read or listen to
- You will be asked to respond to them in ways such as:
  - Repeating them back
  - Making judgments on whether they are similar or different
  - Judging their acceptability on some sort of scale
  - Etc.

This is not intended as an evaluation of your intelligence and/or knowledge. I am interested in your opinion about the items you will see and/or hear.

Time Commitment:
Your participation in this research study is expected to last for approximately 15-20 minutes, though you are welcome to take longer if you find you need extra time.

Potential Risks or Discomforts:
Participation in any study carries with it some risk of subject privacy and data confidentiality. I have taken substantial measures to minimize any risks and potential security breaches. Your Mechanical Turk number and name will NOT be mentioned in any report of the results. No identifying characteristics will be reported in the results. In the data analysis, your responses will be combined with those from other participants.

My research advisor and I may publish the results of this study, but will not publish any identifying characteristics. I will not ask for your name. The data from this study will be filed under an anonymous code number and will be stored in a password protected folder.

If you find participating in the study to be uncomfortable, for any reason at all, you may stop at any time.

**Potential Benefits:**

- There is no specific personal benefit to you from participating, but the results of the study will increase scientific understanding of how humans process and understand language. We will be very grateful for your contribution to this research goal.

- If you would like to know the outcomes of this research, please send a brief request to the project’s email address: (tcallahankanik@gradcenter.cuny.edu). We will send you a copy of the report when it is available.

**Payment for Participation:**

- For your time, you will receive $2.34 in compensation through the Mechanical Turk payment method. You must complete the survey fully to be able to qualify for compensation.
• You will only ever be eligible for compensation for ONE version of this survey (there will be multiple versions of this survey).

• Please note that I will be screening responses to ensure that your answers fall within an acceptable error rate that suggests you did not answer the questions randomly. If your answers do not pass this screening, I will not be able to compensate you. In the event of this, none of your data or information will be recorded.

• Barring any emergencies or unforeseen complications, you should be compensated within a week of your participation.

Confidentiality:
We will make our best efforts to maintain confidentiality of any information that is collected during this research study, and that can identify you. We will disclose this information only with your permission or as required by law.

Your Mechanical Turk number and name will NOT be mentioned in any report of the results. No identifying characteristics will be reported in the results. We will protect your confidentiality by creating unique identifiers for your individual data, which can in no way identify you personally. Any links between these unique identifiers and your Mechanical Turk worker ID or name, or any other identifying information that we may possibly ever receive (e.g. your email address if you email us) will only be retained for monetary compensation purposes and will only ever be available to the primary investigator and her advisor. These links will be stored separately from the study data and both will be stored in a password protected folder. In the data analysis, your responses will be combined with those from other participants.
The research team, authorized CUNY staff, and government agencies that oversee this type of research may have access to research data and records in order to monitor the research. Research records provided to authorized, non-CUNY individuals will not contain identifiable information about you. Publications and/or presentations that result from this study will not identify you by name.

The data you provide may be shared with other researchers doing work in related areas. No identifying characteristics will be provided to these researchers and your Mechanical Turk number and name will only ever be known by the primary investigator and her advisor.

**Participants’ Rights:**

- Your participation in this research study is entirely **voluntary**. If you decide not to participate, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled.

- You can decide to withdraw your consent and stop participating in the research at any time, without any penalty.

**Questions, Comments or Concerns:**

If you have any questions, comments or concerns about the research, please feel free to email them to me at (tcallahankanik@gradcenter.cuny.edu). I will respond as promptly as possible.
If you have questions about your rights as a research participant, or you have comments or concerns that you would like to discuss with someone other than the researchers, please call the CUNY Research Compliance Administrator at 646-664-8918. Alternately, you can write to:

CUNY Office of the Vice Chancellor for Research
Attn: Research Compliance Administrator
205 East 42nd Street
New York, NY 10017

**Digital Acceptance of Participant:**
If you agree to participate in this research study, please click the “I accept” option below this form. Please keep a copy of this consent form for your records.

I have read the above purpose of the study, and understand my role in participating in the research. I volunteer to take part in this research. I have had a chance to ask questions. If I have questions later, about the research, I can ask the investigator listed above. I understand that I may refuse to participate or withdraw from participation at any time without jeopardizing my employment, student status or other rights to which I am entitled. The investigator may withdraw me at his/her professional discretion. If I have questions about my rights as a research participant, I can call the CUNY Research Compliance Administrator at 646-664-8918. I certify that I am 18 years of age or older and freely give my consent to participate in this study. I will receive a copy of this document for my records.
Appendix H: Final experiment explanation and tutorial

TUTORIAL

For this task, you will be presented with sentences and then asked to judge their acceptability as well-formed sentences of English.

There are two types of sentences in this task:

A) Sentences where no specific situation is provided: these should be judged on their grammatical acceptability in spoken English. (There will be examples below.)

B) Sentences where a specific situation is provided (marked by a "Situation" tag): these are to be judged as spoken in the specifically defined situations provided. These situations consist of a few sentences to provide a contextual setting. You will then be asked to judge how acceptable you find the sentence, given the situation. For these sentences, in some cases you may find them grammatically unacceptable, while in other cases you may find them unacceptable because they're simply untrue, given the situation. (Again, there will be examples below.)

For both sentence types, you will rate them on a scale from 1 to 6, with 1 being “Completely Unacceptable” and 6 being “Completely Acceptable.”

Capital letters indicate verbal emphasis:

All of the sentences will consist of two parts separated by a semicolon and will have some words written with CAPITAL LETTERS. Please think of these words in capitals as receiving emphasis in the
sentence. By emphasis, we mean that if you were to say the sentence aloud, you would pronounce those words louder or with more stress in order to emphasize them. For example:

John SAW his sister; he didn’t SPEAK to her.

In this sentence, the speaker is emphasizing that John saw his sister but didn’t speak to her by emphasizing the verbs “saw” and “speak.”

**Sentences with different versions:**

Throughout this task, you will see different versions of sentences that you may have seen previously. They have been placed in a random order. Note that these are not duplicate sentences; the versions have small differences. Often, only one or two words will differ between the versions; however, your judgments for them may not be the same. Therefore, it is important that you evaluate each presentation separately, ignoring your judgment on any other versions.

**Examples:**

The following examples are provided to help you understand the task. For each of them, indicate on the scale how you would rate their acceptability.

Example 1: I ate a SNACK; I didn’t eat a MEAL.
Answer 1A: Since there is no "Situation" tag preceding the sentence, we are judging it on its grammatical acceptability. To a native speaker of English (learned as their first language), this sentence is completely acceptable, therefore, a typical expected answer to Example 1 would be high on the scale (e.g. a “6”).

Now imagine that somebody said the following sentence:

Example 2: I ate a SNACK; I didn’t very eat a MEAL.

Answer 2: A native speaker of English would probably score Example 2 low on the scale (e.g. a “1”). While only one word ("very") has been added to this sentence, a typical speaker of English would find this sentence completely unacceptable.
Here is a different example.

Example 3: Wallace didn’t make some PROGRESS; he actually suffered a REGRESSION.

Click on a number for your acceptability judgment (1 being "Completely Unacceptable," 6 being "Completely Acceptable")

1 2 3 4 5 6

Answer 3: This is an example of a sentence which for many English speakers may not lie clearly on one end of the scale or the other. The way this sentence is worded makes this example trickier, due to how different speakers of English may feel about the emphasis of the phrase “some PROGRESS.” You may or may not regard this sentence as completely unacceptable or completely acceptable. If you find this sentence to sound strange, but not completely unacceptable, you might rate it a “2.” On the other hand, if this sentence sounds pretty good to you, but not perfect, you might rate it a “4” or “5.”

Here's another example of a sentence that people may disagree about. What do you think? Keep in mind that you are trying to judge how grammatically acceptable this sentence is in spoken English. If you heard a speaker say the following sentence, how acceptable would you find it? Your judgment may vary widely from other speakers of English depending on your own opinions about the language.
Example 4: Mother sent my brother and I out to play.

Click on a number for your acceptability judgment (1 being "Completely Unacceptable," 6 being "Completely Acceptable")

1 2 3 4 5 6

Some of the questions you will see on this survey begin with a "Situation" tag. An example of a Situation question is provided below.

Example 5:

**Situation:** Warren often takes vacations to go fishing. On his last trip, he visited a lake with his friends. Every morning, they took a canoe out onto the lake. Over the course of the vacation, Warren caught seven salmon and his friend Joseph caught five.

Is the following a sentence that is both acceptable and true, given this situation?

WARREN didn’t catch any fish on the trip; JOSEPH caught five.

Click on a number for your acceptability judgment (1 being "Completely Unacceptable," 6 being "Completely Acceptable")

1 2 3 4 5 6
Answer 5: While this is a grammatically acceptable sentence, it's not true in the described situation. The situation specifically stated that Warren caught seven salmon, which means he caught fish. Therefore, this sentence should get a low score (e.g. "1").

You are now ready to begin the survey. Good luck and thank you for your time.
Appendix I: List composition (all lists)

4 PAIRS of NEG NPI sentences
4 PAIRS of JUST NPI sentences
4 PAIRS of ONLY NPI sentences
2 Modal Scope (MAY + EXCLUSIVE) sentences
21 FILLER PAIRS
10 Modal/Short Story FILLER SENTENCES
Total: 78 Sentences

List A NEG Sentences: 1, 4, 7, 10
List B NEG Sentences: 3, 6, 9, 12
List C NEG Sentences: 2, 5, 8, 11
List A ONLY Sentences: 2, 5, 8, 11
List B ONLY Sentences: 1, 4, 7, 10
List C ONLY Sentences: 3, 6, 9, 12
List A JUST Sentences: 3, 6, 9, 12
List B JUST Sentences: 2, 5, 8, 11
List C JUST Sentences: 1, 4, 7, 10

List A Modal/Scope: 13-ONLY, 14-JUST
List B Modal/Scope: 13-JUST, 15-ONLY
List C Modal/Scope: 14-ONLY, 15-JUST
## Appendix H: Final experiment lists

### Color Legend:

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey</td>
<td>Padding Fillers (Warm-ups and Ends)</td>
</tr>
<tr>
<td>Green</td>
<td>A Fillers</td>
</tr>
<tr>
<td>Blue</td>
<td>B Fillers</td>
</tr>
<tr>
<td>Yellow</td>
<td>Context Filler</td>
</tr>
<tr>
<td>Dark Orange</td>
<td>Experimental Item</td>
</tr>
<tr>
<td>Red Outline</td>
<td>Ungrammatical Filler OR Unacceptable, given Context (for Context Fillers)</td>
</tr>
</tbody>
</table>

### List A:

<table>
<thead>
<tr>
<th>WU1</th>
<th>F20A</th>
<th>David tells me that GEOLOGY is difficult to teach kids at summer camp; Leigh tells me that PAINTING is, instead.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WU2</td>
<td>F14B</td>
<td>Darcy is surprised that her FATHER loved to build model airplanes tomorrow; she isn't surprised that her MOTHER did.</td>
</tr>
<tr>
<td>WU3</td>
<td>F33</td>
<td>Lewis can pick up the clothes from the dry cleaners TODAY; he can't do it TOMORROW.</td>
</tr>
</tbody>
</table>

### Alpha Block: 9 B Fillers, 10 A Fillers, 4 Context Fillers, 1 Modal/Scope

<table>
<thead>
<tr>
<th>1a</th>
<th>F1B</th>
<th>Josephine admires that OWEN took his dog on vacation with him last summer; she doesn't admire that DEREK also took his.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1b</td>
<td>1A-NEG</td>
<td>Wendy doesn't think that BERNARD ruins her parties; she thinks that KATHY ruins them.</td>
</tr>
<tr>
<td>1c</td>
<td>14-JUST</td>
<td>James may just drive the VAN without his parents; he may not drive the SPORTS CAR.</td>
</tr>
<tr>
<td>2a</td>
<td>F16B</td>
<td>Jimmy complains that his FATHER does.</td>
</tr>
<tr>
<td>2b</td>
<td>2A-ONLY</td>
<td>John only knows that JEROME visited our friends in Sweden; he doesn't know that MARY visited them.</td>
</tr>
<tr>
<td>2c</td>
<td>F12A</td>
<td>Carver concludes that his ASSISTANT plays tennis at the country club; he doesn't conclude that his SECRETARY does.</td>
</tr>
<tr>
<td>3a</td>
<td>F26</td>
<td>The teacher must grade the final exams by TOMORROW; she doesn't have to submit grades until NEXT WEEK.</td>
</tr>
<tr>
<td>3b</td>
<td>3A-JUST</td>
<td>Andrew just believes that SUZANNE ordered soup at lunch; he doesn't believe that GREG did.</td>
</tr>
<tr>
<td>3c</td>
<td>F2B</td>
<td>The tech representative tells me that JULIA worked night shifts this last week; he didn't tell me that HARVEY did, too.</td>
</tr>
<tr>
<td>4a</td>
<td>F17B</td>
<td>Bill confides that GEORGIA'S parents a little hated her kindergarten teacher; Kyle confides that TABITHA'S parents did.</td>
</tr>
<tr>
<td>4b</td>
<td>4A-NEG</td>
<td>The renters aren’t concerned that the CHAMPAGNE spilled on the carpet; they’re concerned that the BEER spilled.</td>
</tr>
<tr>
<td>4c</td>
<td>F11B</td>
<td>The child is upset that ALPHONSE rudely sipped her apple juice; she isn’t upset that WALLACE did.</td>
</tr>
<tr>
<td>5a</td>
<td>F28</td>
<td>The cake should have been ordered YESTERDAY; the ice cream didn't need to be picked up until TODAY.</td>
</tr>
<tr>
<td>Beta Block: 9 A Fillers, 10 B Fillers, 4 Context Fillers, 1 Modal/Scope</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5b</td>
<td>5A-ONLY</td>
<td>Ethan only wants DENISE to meet his relatives; he doesn’t want RICHARD to meet them.</td>
</tr>
<tr>
<td>5c</td>
<td>F3A</td>
<td>The teacher notices that ALFRED brought his tablet on the school trip; she doesn’t notice that JARED did, too.</td>
</tr>
<tr>
<td>6a</td>
<td>F13A</td>
<td>Jen reads that BEARS catch fish at the river outside of town; she doesn’t read that OTTERS do, too.</td>
</tr>
<tr>
<td>6b</td>
<td>6A-JUST</td>
<td>Our boss just hopes that ELAINE volunteers to transfer; he doesn’t hope that CARRIE volunteers.</td>
</tr>
<tr>
<td>6c</td>
<td>F10B</td>
<td>Louisa forgets that TIMOTHY will sing in the play yesterday; she doesn’t forget that LAWRENCE will sing in it, too.</td>
</tr>
<tr>
<td>7a</td>
<td>F4A</td>
<td>The doctor doesn’t recommend that JAMAL start any weight-training; he recommends that LAURA start.</td>
</tr>
<tr>
<td>7b</td>
<td>7B-NEG</td>
<td>The teacher notices that ALFRED brought his tablet on the school trip; she doesn’t notice that JARED did, too.</td>
</tr>
<tr>
<td>7c</td>
<td>F19B</td>
<td>My best friend writes that her COWORKER kind of annoys her at her job; my brother writes that his SUPERVISOR does.</td>
</tr>
<tr>
<td>8a</td>
<td>F18A</td>
<td>Timothy assumes that JOSEPH wanted to buy popsicles for dessert; Anthony assumes that SERENA wanted to buy them herself.</td>
</tr>
<tr>
<td>8b</td>
<td>8B-ONLY</td>
<td>The rich couple only claim that the CHAUFFEUR ever dented their sports car; they don’t claim that the VALET did.</td>
</tr>
<tr>
<td>8c</td>
<td>F9A</td>
<td>My father demonstrates that ROBINS visit his birdhouse; he doesn’t demonstrate that HUMMINGBIRDS also visit it.</td>
</tr>
<tr>
<td>9a</td>
<td>F32</td>
<td>The lawyer can meet with his important client TOMORROW; he can’t meet with her TODAY.</td>
</tr>
<tr>
<td>9b</td>
<td>9B-JUST</td>
<td>The film critic just says that JOANNE borrowed any of his movies; he doesn’t say that WILBUR borrowed them.</td>
</tr>
<tr>
<td>9c</td>
<td>F5A</td>
<td>Natalie senses that her BROTHER will make milkshakes for the picnic; she doesn’t sense that her SISTER will.</td>
</tr>
<tr>
<td>10a</td>
<td>F14A</td>
<td>Darcy is surprised that her FATHER loved to build model airplanes; she isn’t surprised that her MOTHER did.</td>
</tr>
<tr>
<td>10b</td>
<td>10B-NEG</td>
<td>My brother doesn’t recall that EILEEN ever slept through our cousin’s recitals; he recalls that DEREK slept through them.</td>
</tr>
<tr>
<td>10c</td>
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<td>KATHY ruins them.</td>
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confides that TABITHA’S parents did.
The tech representative tells me that JULIA worked night shifts this week; he didn’t tell me that HARVEY did, too.

22b 10A-NEG My brother doesn’t recall that EILEEN slept through our cousin’s recitals; he recalls that DEREK slept through them.

22c F25 Terrance must clean INSIDE today; he doesn’t have to work OUTSIDE.
Carver concludes that his ASSISTANT frequently plays tennis at the country club; he doesn’t conclude that his SECRETARY does.

23a F12B 11A-ONLY My brother doesn’t recall that EILEEN slept through our cousin’s recitals; he recalls that DERK slept through them.

23b 11A-ONLY My brother is only convinced that YVONNE takes milk in her coffee; he’s not convinced that RUTH does.

23c F16A 13-ONLY Linda complains that her MOTHER-IN-LAW listens to country music; Jimmy complains that his FATHER does.

24a F1A 12A-JUST Nick may only eat PIZZA for dinner tonight; he may not have BREADSTICKS as well.

24b 12A-JUST The chef just admits that the DESSERTS were served late; she doesn’t admit that the APPETIZERS were.

24c 13-ONLY Josephine admires that OWEN took his dog on vacation with him last summer; she doesn’t admire that DERK also took his.

E1 F21B Gilbert brags that his GRANDMOTHER excels really at cribbage; Felicity brags that her HUSBAND does.

E2 F30 The Girl Scout should ask the office workers ONE time if they want to buy cookies; she doesn’t need to ask them MANY times.

E3 F7A Penelope is certain that my AUNT has a recital in March; she’s not certain that my COUSIN has one.

List B:

WU1 F20A David tells me that GEOLOGY is difficult to teach kids at summer camp; Leigh tells me that PAINTING is, instead.

WU2 F14B Darcy is surprised that her FATHER loved to build model airplanes tomorrow; she isn’t surprised that her MOTHER did.

WU3 F33 Lewis can pick up the clothes from the dry cleaners TODAY; he can’t do it TOMORROW.

Alpha Block: 9 B Fillers, 10 A Fillers, 4 Context Fillers, 1 Modal/Scope

1a F1B Josephine admires that OWEN took his dog on vacation with him last summer; she doesn’t admire that DERK also took his.

1b 1A-JUST Wendy only thinks that BERNARD ruins her parties; she doesn’t think that KATHY ruins them.

1c 13-ONLY Nick may just eat PIZZA for dinner tonight; he may not have BREADSTICKS as well.

2a F16B Linda complains that her MOTHER-IN-LAW kind of listens to country music; Jimmy complains that his FATHER does.

2b 2A-JUST John just knows that JEROME visited our friends in Sweden; he doesn’t know that MARY visited them.

2c F12A Carver concludes that his ASSISTANT plays tennis at the country club; he doesn’t conclude that his SECRETARY does.

3a F26 The teacher must grade the final exams by TOMORROW; she doesn’t have to submit grades until NEXT WEEK.
Andrew doesn’t believe that SUZANNE ordered soup at lunch; he believes that GREG did.

The tech representative tells me that JULIA worked night shifts this last week; he didn’t tell me that HARVEY did, too.

Bill confides that GEORGIA’S parents a little hated her kindergarten teacher; Kyle confides that TABITHA’S parents did.

The renters are only concerned that the CHAMPAGNE spilled on the carpet; they aren’t concerned that the BEER spilled.

The child is upset that ALPHONSE rudely sipped her apple juice; she isn’t upset that WALLACE did.

The cake should have been ordered YESTERDAY; the ice cream didn’t need to be picked up until TODAY.

Ethan just wants DENISE to meet his relatives; he doesn’t want RICHARD to meet them.

The teacher notices that ALFRED brought his tablet on the school trip; she doesn’t notice that JARED did, too.

Jen reads that BEARS catch fish at the river outside of town; she doesn’t read that OTTERS do, too.

Our boss doesn’t hope that ELAINE volunteers to transfer; he hopes that CARRIE volunteers.

Louisa forgets that TIMOTHY will sing in the play yesterday; she doesn’t forget that LAWRENCE will sing in it, too.

Milly is sad that the ELECTRIC BILL was lost in the mail on Tuesday; she isn’t sad that the WATER BILL was lost.

The doctor only recommends that JAMAL start any weight-training; he doesn’t recommend that LAURA start.

My best friend writes that her COWORKER kind of annoys her at her job; my brother writes that his SUPERVISOR does.

Timothy assumes that JOSEPH wanted to buy popsicles for dessert; Anthony assumes that SERENA wanted to buy them herself.

The rich couple just claim that the CHAUFFEUR ever dented their sports car; they don’t claim that the VALET did.

My father demonstrates that ROBINS visit his birdhouse; he doesn’t demonstrate that HUMMINGBIRDS also visit it.

The lawyer can meet with his important client TOMORROW; he can’t meet with her TODAY.

The film critic doesn’t say that JOANNE borrowed any of his movies; he says that WILBUR borrowed them.

Natalie senses that her BROTHER will make milkshakes for the picnic; she doesn’t sense that her SISTER will.

Darcy is surprised that her FATHER loved to build model airplanes; she isn’t surprised that her MOTHER did.

My brother only recalls that EILEEN ever slept through our cousin’s recitals; he doesn’t recall that DEREK slept through them.

The vice principal remarks that KENNETH gets high marks on his exams; she doesn’t remark that JESSE does, too.

Tim likes that the POPCORN will be served fresh at the movie showing; he doesn’t like that the NACHOS will be served fresh, too.

My husband is just convinced that YVONNE takes any milk in her coffee; he’s not convinced that RUTH does.
My piano teacher informs me that SPINACH is really the healthiest food; my physical therapist informs me that CARROTS are.

Howard can visit Jamaica this SPRING; he isn’t able to go this WINTER.

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The doctor only recommends that JAMAL start weight-training; he doesn’t recommend that LAURA start.

Jen reads that BEARS patiently catch fish at the river outside of town; she doesn’t read that OTTERS do, too.
| 20a | F3B | The teacher notices that ALFRED brought his tablet on the last school trip; she doesn’t notice that JARED did, too. |
| 20b | 8A- JUST | The rich couple just claim that the CHAUFFEUR dented their sports car; they don’t claim that the VALET did. |
| 20c | F27 | The family dog must quickly obey Clark to get treats; she doesn’t have to obey Clark’s kids to get treats. |
| 21a | F11A | The child is upset that ALPHONSE sipped her apple juice; she isn’t upset that WALLACE did. |
| 21b | 9A- NEG | The film critic doesn’t say that JOANNE borrowed his movies; he says that WILBUR borrowed them. |
| 21c | F17A | Bill confides that GEORGIA’S parents hated her kindergarten teacher; Kyle confides that TABITHA’S parents did. |
| 22a | F2A | The tech representative tells me that JULIA worked night shifts this week; he didn’t tell me that HARVEY did, too. |
| 22b | 10A- ONLY | My brother only recalls that EILEEN slept through our cousin’s recitals; he doesn’t recall that DEREK slept through them. |
| 22c | F25 | Terrance must clean INSIDE today; he doesn’t have to work OUTSIDE. |
| 23a | F12B | Carver concludes that his ASSISTANT frequently plays tennis at the country club; he doesn’t conclude that his SECRETARY does. |
| 23b | 11A- JUST | My husband is just convinced that YVONNE takes milk in her coffee; he’s not convinced that RUTH does. |
| 23c | F16A | Linda complains that her MOTHER-IN-LAW listens to country music; Jimmy complains that his FATHER does. |
| 24a | 12A- NEG | The chef doesn’t admit that the DESSERTS were served late; she admits that the APPETIZERS were. |
| 24b | F1A | Josephine admires that OWEN took his dog on vacation with him last summer; she doesn’t admire that DEREK also took his. |
| 24c | F1B | Belinda may only take honors HISTORY this semester; she may not take honors PHYSICS. |
| E1 | F21B | The Girl Scout should ask the office workers ONE time if they want to buy cookies; she doesn’t need to ask them MANY times. |
| E2 | F30 | Penelope is certain that my AUNT has a recital in March; she’s not certain that my COUSIN has one. |
| E3 | F7A | Josephine admires that OWEN took his dog on vacation with him summer; she doesn’t admire that DEREK also took his. |
| Alpha Block: 9 B Fillers, 10 A Fillers, 4 Context Fillers, 1 Modal/Scope | | |
| 1a | F1B | Josephine admires that OWEN took his dog on vacation with him last summer; she doesn’t admire that DEREK also took his. |
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<td>James may only drive the VAN without his parents; he may not drive the SPORTS CAR.</td>
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<td>Linda complains that her MOTHER-IN-LAW kind of listens to country music; Jimmy complains that his FATHER does.</td>
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**Beta Block: 9 A Fillers, 10 B Fillers, 4 Context Fillers, 1 Modal/Scope**

| 13a | F21A | Gilbert brags that his GRANDMOTHER excels at cribbage; Felicity brags that her HUSBAND does. |
| 13b | 1B- JUST | Wendy just thinks that BERNARD ruins any of her parties; she doesn’t think that KATHY ruins them. |
| 13c | F31 | At the library, William can quietly listen to his music with HEADPHONES; he can’t use his SPEAKERS. |
| 14a | F15A | My piano teacher informs me that SPINACH is the healthiest food; my physical therapist informs me that CARROTS are. |
| 14b | 2B- NEG | John doesn’t know that JEROME ever visited our friends in Sweden; he knows that MARY visited them. |
| 14c | F6B | Tim likes that the POPCORN will be served fresh at the next movie showing; he doesn’t like that the NACHOS will be served fresh, too. |
| 15a | F8B | The vice principal remarks that KENNETH quickly gets high marks on his exams; she doesn’t remark that JESSE does, too. |
| 15b | 3B- ONLY | Andrew only believes that SUZANNE ordered any soup at lunch; he doesn’t believe that GREG did. |
| 15c | F20B | David tells me that GEOLOGY is a little difficult to teach kids at summer camp; Leigh tells me that PAINTING is, instead. |
| 16a | F5B | Natalie senses that her BROTHER will make milkshakes for the next picnic; she doesn’t sense that her SISTER will. |
| 16b | 4B- JUST | The renters are just concerned that the CHAMPAGNE ever spilled on the carpet; they aren’t concerned that the BEER spilled. |
| 16c | F29 | Larry should roughly HIT the vending machine; he shouldn’t carefully TAP it. |
| 17a | F9B | My father demonstrates that ROBINS regularly visit his birdhouse; he doesn’t demonstrate that HUMMINGBIRDS also visit it. |
| 17b | 5B- NEG | Ethan doesn’t want DENISE to meet any of his relatives; he wants RICHARD to meet them. |
| 17c | F18B | Timothy assumes that JOSEPH really wanted to buy popsicles for dessert; Anthony assumes that SERENA wanted to buy them herself. |
My best friend writes that her COWORKER annoys her at her job; my brother writes that his SUPERVISOR does.

Our boss only hopes that ELAINE ever volunteers to transfer; he doesn’t hope that CARRIE volunteers.

Milly is sad that the ELECTRIC BILL was lost in the mail on last Tuesday; she isn’t sad that the WATER BILL was lost.

Louisa forgets that TIMOTHY will sing in the play; she doesn’t forget that LAWRENCE will sing in it, too.

The doctor just recommends that JAMAL start weight-training; he doesn’t recommend that LAURA start.

Jen reads that BEARS patiently catch fish at the river outside of town; she doesn’t read that OTTERS do, too.

The teacher notices that ALFRED brought his tablet on the last school trip; she doesn’t notice that JARED did, too.

The rich couple don’t claim that the CHAUFFEUR dented their sports car; they claim that the VALET did.

The family dog must quickly obey Clark to get treats; she doesn’t have to obey Clark’s kids to get treats.

The child is upset that ALPHONSE sipped her apple juice; she isn’t upset that WALLACE did.

The film critic only says that JOANNE borrowed his movies; he doesn’t say that WILBUR borrowed them.

Bill confides that GEORGIA’S parents hated her kindergarten teacher; Kyle confides that TABITHA’S parents did.

The tech representative tells me that JULIA worked night shifts this week; he didn’t tell me that HARVEY did, too.

My brother just recalls that EILEEN slept through our cousin’s recitals; he doesn’t recall that DEREK slept through them.

Terrance must clean INSIDE today; he doesn’t have to work OUTSIDE.

Carver concludes that his ASSISTANT frequently plays tennis at the country club; he doesn’t conclude that his SECRETARY does.

My husband isn’t convinced that YVONNE takes milk in her coffee; he’s convinced that RUTH does.

Linda complains that her MOTHER-IN-LAW listens to country music; Jimmy complains that his FATHER does.

Belinda may just take honors HISTORY this semester; she may not take honors PHYSICS.

The chef only admits that the DESSERTS were served late; she doesn’t admit that the APPETIZERS were.

Josephine admires that OWEN took his dog on vacation with him summer; she doesn’t admire that DEREK also took his.

Gilbert brags that his GRANDMOTHER excels really at cribbage; Felicity brags that her HUSBAND does.

The Girl Scout should ask the office workers ONE time if they want to buy cookies; she doesn’t need to ask them MANY times.

Penelope is certain that my AUNT has a recital in March; she’s not certain that my COUSIN has one.


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