Stripping isn't so Mysterious, or Anomalous Scope, either

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Abstract. This paper discusses a common variety of *ellipsis* phenomena in English called *Stripping*, with particular focus on the observation of so-called *anomalous scope* of negation and auxiliaries in Stripping sentences, and the difficulties that this data poses for existing analyses of Stripping. I then propose an extension to a recent Hybrid Type-Logical Categorical Grammar account of Gapping that adequately covers Stripping while straightforwardly accounting for the scope anomalies. This anomalous scope is a fascinating formal problem on the syntax-semantics interface that has been thus far overlooked in the stripping literature.

Keywords: Stripping · Anomalous Scope · Distributed Scope · Hybrid Type-Logical Categorial Grammar · Categorial Grammar · Ellipsis.

1 Introduction

Stripping is common variety of ellipsis in English. Analyses of this kind of construction, have been stymied by Stripping's uncertain relationship with Gapping, and the semantic puzzle of anomalous scope. I investigate these problems through the use of a categorical framework with a flexible Syntax-Semantics interface, and present an analytical fragment to make steps towards addressing these issues in tandem.

This paper is organized as follows. Section 2 introduces the main phenomena discussed in this paper, Stripping and Anomalous Scope, in the context of the problem of Ellipsis and existing work on Gapping. Section 3 demonstrates why Stripping cannot just be analyzed as a simpler base-case of Gapping, but is a rather different phenomenon altogether. Section 4 discusses Low-VP Coordination, the main alternative analysis that accounts for Anomalous Scope in Gapping, and outlines how that analysis could be extended to cover Stripping. Section 5 outlines the theoretical shortcomings of such an extension, and the problems that still remain for a satisfactory account of Stripping and Anomalous scope. Section 6 introduces the HTLCG framework as required for the current analytical fragment. Section 7 introduces the analysis of English stripping in terms of HTLCG. It is also demonstrates how the wide and distributed scope readings of modals and auxiliaries obtain. Finally, Section 8 provides a discussion of the larger problem of Anomalous scope in English beyond Stripping and Gapping, and its extensions to other scope-taking modals and auxiliaries than simply negation.

2 Stripping, Gapping, and Anomalous Scope

The problem of ellipsis can be informally defined as cases where the following four facts hold:

(1) a. Something is uttered that doesn't look (by itself) to be a "fully formed" sentence.
b. The utterance is nonetheless taken to have a "fully-formed" meaning.
c. The meaning of the utterance is highly dependent on the context in which it is uttered.
d. Speakers, given the same context, generally agree on the exact "fully formed" meaning of the utterance.

It is fairly uncontroversial that (2-a) and (2-b) below are indistinguishable in terms of their truth conditional content.[1] (2-a) is simply an example of sentential coordination. (2-b), on the other hand, is an example of what is commonly referred to in the literature as *Stripping* [5,22,4].

(2) a. John ate a burger, and Mary ate a burger (too).
b. John ate a burger, and Mary (too).

The following sentences also mean roughly the same thing. Example (3-a) is also again simply sentence coordination, while (3-b) is an example of what is commonly referred to as *Gapping* [7,8,9,20,17,18].

(3) a. John ate a burger, and Mary ate a sub.
b. John ate a burger, and Mary a sub.

While (2-b) and (3-b) may appear very similar, a survey of linguistic data reveals that there are generally four main parts of these kinds of constructions, and that these components behave in predictably different ways. In both (2-b) and (3-b), there are two conjuncts. In both cases, the first conjunct, *John ate a burger*, could be a fully satisfactory standalone sentence, while the second conjunct, *Mary (too)* or *Mary a sub*, couldn't, because there is stuff in the first conjunct that is missing from the second one. I refer to this 'missing' material that is only present in the first conjunct as the continuation . The parts of the two conjuncts that aren't missing parallel each other. I call this overt material in the non-sentential conjunct the ASSOCIATE, while I call its counterpart in the more full antecedent conjunct the FOCUS. The bits left over connecting the first and second conjuncts together I shall call the **functor**. Thus in the following Stripping and Gapping examples, the FOCUS and ASSOCIATE are in small caps, the continuation is underlined, and the **functor** is in bold. (4-a) and (4-b) are both examples of Stripping, while (4-c) and (4-d) are parallel Gapping examples.

(4) a. **Either** JOHN applied for the job, **or** SANDY.

[1] Assuming we aim for the reading of (2-b) in which Mary is an eater, which is a case of subject-stripping, rather than the reading in which John is a cannibal, which would be object-stripping.

b. Mary told JOHN about the job, **and** SANDY, **(too)**.
c. **Either** JOHN applied for THE JOB, **or** SANDY THE GRANT.
d. Mary told JOHN about THE JOB, **and** SANDY THE GRANT.

These examples make it plain to see one descriptive generalization that we can use to pretheoretically distinguish between Stripping and Gapping sentences. In the case of Gapping, the FOCUS , "JOHN ... THE JOB" is a non-contiguous string. In the case of Stripping however, the FOCUS , here "JOHN," is a contiguous string. This observation turns out to be a simple and effective way of distinguishing Stripping constructions from Gapping ones without having to appeal to theoretically-motivated assumptions.

One thing that both Stripping and Gapping (among other constructions) exhibit is a peculiar semantic phenomenon whereby negation that appears inside of one disjunct can scope widely over the entire disjunction ([21,17]). Just as bizarre is the observation that in the same sentence, if the reading is forced where negation doesn't have wide scope, it does not have narrow scope just in the first disjunct where it physically appears, but rather is distributed to both disjuncts. Thus, for a sentence such as (5) below, we can obtain readings for wide scope negation as in (5-a), or distributed negation as in (5-b), but the narrow scope negation reading in (5-c) is unavailable. While the distributed reading is expected, the wide scope reading in (5-a) where negation scopes over disjunction is what is referred to as *anomalous scope*. It is important to note that this effect is not limited to negation, however, but occurs for a range of modals and auxiliaries.

(5) John can't sleep, or Mary.
a. Wide-Scope Negation $\neg\diamond(\text{sleep}(j) \vee \text{sleep}(m))$
   (i) John can't sleep and Mary can't sleep.
b. Distributed Negation $\neg(\diamond\text{sleep}(j)) \vee \neg(\diamond\text{sleep}(m))$
   (i) It's not the case that (both) John can sleep and Mary can sleep.
c. Narrow-scope Negation $\neg(\diamond\text{sleep}(j)) \vee \diamond\text{sleep}(m)$
   (i) It's the case that John can't sleep, or Mary can sleep (or both).

3 Stripping isn't just Simple Gapping

Before moving on to analyses of stripping, it is worth taking stock of where we are at the moment, and what the empirical facts of Stripping tell us. Section 2 demonstrated a fairly simple way of telling Stripping and Gapping apart, that being that in the case of Stripping, the FOCUS is a single contiguous string, while the FOCUS in a Gapping sentence can be noncontiguous. It is tempting to thus think of Stripping as simply the simplest possible kind of Gapping, as a sort of contiguous base-case. But even a casual survey of the facts demonstrates that Stripping and Gapping act in very different ways, which reflect the fact that they are surprisingly distinct phenomena, and thus my treatment of Stripping functions very differently than the account of Gapping from which it originates.

One important difference between Stripping and Gapping is that the set of **functors** that can be felicitously used in Stripping constructions only partially overlaps with the set of **functors** in Gapping sentences. This can be seen below where (6)a, c, and e are perfectly fine Stripping constructions, but don't work as Gapping constructions.

(6)
a. John went to the store before Mary.
b. *John went to the store before Mary the beach.
c. John went to the store, then Mary.
d. *John went to the store, then Mary the beach.
e. John went to the store, but not Mary.
f. *John went to the store, but not Mary the beach.

In addition, it is widely recognized that Gapping does not allow extraction from embedded clauses.[22,29] While Stripping is not as free as Pseudogapping, for instance, it can extract from embedded clauses, especially when there is no overt complementizer, such as *that*. Examples such as these also prevent one from being able to treat cases of object stripping as simply NP coordination with unusual prosody.

(7)
a. John would go to the movies with Linda, but I very much doubt anyone else/Charlie.
b. *John would go to the movies with Linda, but I very much doubt Bill Charlie.

The foregoing facts make clear that there are important differences between Stripping and Gapping, which contraindicate any simple assimilation of the former into the latter.

4 Alternative Approach: Stripping as Low-VP Coordination

While to my knowledge there have been no analyses proposed for Stripping that account for the anomalous scope problem described above, such proposals have been made for Gapping. One such line of analysis, first proposed in [7], is the Low VP-Coordination analysis.

It is well accepted in the mainstream generative literature [22,29] that Stripping is not a movement-based phenomenon like fronting or scrambling, and so most contemporary analyses in that syntactic framework treat Stripping as some sort of coordination and ellipsis. Thus, an alternative analysis to my proposal is to move everything but the remnants out of the conjoined phrase, and either deleting or merging together what's left to obtain the correct surface string. Johnson [7], along with updated versions in [9,10] takes just this tack, and gives the main alternative analysis of Gapping that simultaneously has some success accounting for the scope anomalies of Gapping and Stripping discussed in section 2.

Under Johnson's analysis, what appears to be clausal coordination is actually VP coordination where the subject is removed from the conjuncts via Across-The-Board (ATB) movement, that is symmetrically, and into a position higher in the syntactic tree that scopes over the whole coordinate VP phrase. The second thing that happens is that there is a second special, non-ATB movement whereby the subject of the first conjunct is moved to the Spec position of the matrix AgrP, which preserves the surface word order of Subject1-Verb-VP1-Conj-subject2-VP2, without having the verb trapped within the first conjunct, by similarly allowing the subject of the first conjunct to trivially scope over the entire sentence. His analysis is demonstrated in (8-b) below, where the the verb *play* is ATB moved out of both conjuncts to scope over them, and then the subject *Kim* is non-ATB moved to Spec ArgP. This last move is semantically vacuous, and not uncontroversial within Johnson's own research program, but is essential to his analysis of Gapping.

(8) a. Kim didn't play Bingo, or Sandy Chess.
b. [AgrP Kim$_i$ [Agr didn't [TP play$_j$ [VP [VP [DP ~~Kim~~$_i$] [VP ~~play~~$_j$ Bingo] or [VP [DP Sandy] [VP ~~play~~$_j$ Chess]]]]]]

This analysis is straightforward to adapt to Stripping cases, with two tweaks. First I consider subject Strips, cases where the FOCUS and ASSOCIATE are subjects. For subject Strips, the analysis requires that the entire VP (the continuation) be moved symmetrically out of both conjuncts to a wide scope position instead of just the V node as in (8-b) above.

(9) a. KIM didn't play bingo on Saturday, **or** SANDY.
b. [AgrP Kim$_i$ [Agr didn't [TP [VP play bingo on Saturday$_j$] [VP [VP [DP ~~Kim~~$_i$] [VP ~~play bingo on Saturday~~$_j$]] or [VP [DP Sandy] [VP ~~play bingo on Saturday~~$_j$]]]]]]

But Stripping sentences, like Gapping sentences, come in more than one variety. If the FOCUS and ASSOCIATE are objects, rather than subjects, the Low-VP coordination analysis requires a slightly different change. Because now there is asymmetric movement required of the object instead of the subject, we can't simply ATB move the entire VP. However, there is nothing stopping us from ATB moving each part of the VP aside from the Object, as indicated by the traces in (10-b). The three bold movements in (10-b) clearly show how the change of the location of the FOCUS between (9-b) and (10-b) is reflected in the analysis in the form of the asymmetric movement of a DP, while the same component can be ATB moved in the other case.

(10) a. Kim didn't play BINGO on Saturday, **or** CHESS.
b. [AgrP **Kim$_i$** [Agr didn't [TP [VP [VP [V play$_j$] [DP **bingo$_k$**]] [PP on Saturday$_l$]] [VP [VP [DP **~~Kim~~$_i$**] [VP [VP [V ~~play~~$_j$] [DP **~~bingo~~$_k$**]] [PP ~~on Saturday~~$_l$]]] or [VP [DP **~~Kim~~$_i$**] [VP [VP [V ~~play~~$_j$] [DP chess]] [PP ~~on Saturday~~$_l$]]]]]]]

5 Contraindicators to Low-VP Coordination

As we can see, the crux of the Low-VP coordination account is the movement of what we call the continuation and FOCUS by a mixture of symmetrical ATB and asymmetrical means to get the word order to work out correctly, thereby allowing the negative auxiliary to obtain wide scope over the disjunction.

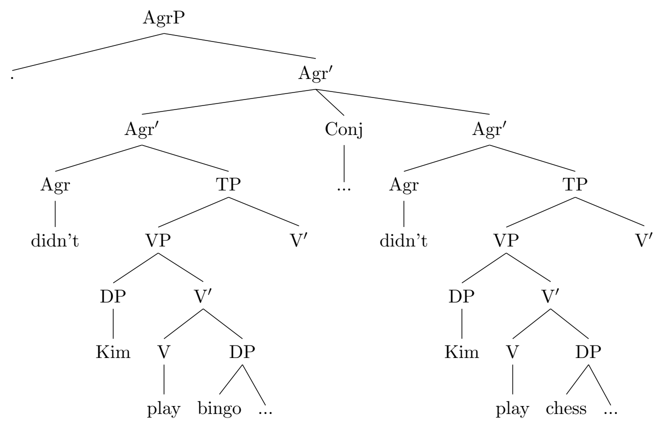
The main problem here is a lack of any independently motivated mechanism to determine how the multiple elements can be moved and dealt with, while preserving word order. While this problem was noted in [17] for Gapping, it is more complicated for Stripping. First, this is a problem in the case of a wide-scope auxiliary such as the modal negation in (10-b), where 'play,' 'bingo,' and 'on Saturday' must be individually moved out of one or both conjuncts, to somehow end up back in the same order. This problem only gets worse if we need to get distributed-scope negation in the semantics, because the negation must originate in the conjuncts, and then be ATB moved out to its surface position above the coordinate phrase.

As shown in (11) below, even without the extra complexity introduced by Johnson's split scope analysis of negative auxiliaries, there are already 24 (4!) different possible ways that 'didn't,' 'kim,' 'play,' and 'bingo' could be ordered, But there is no mention of any mechanism for ensuring that these elements end up in the correct surface ordering.

In addition, given that the movement required in Johnson's account is A′-movement, there has to be an XP head to move these parts into. But even in a theory with Larsonian shells, such XPs would be part of the conjuncts themselves, not the new matrix clause scoping over them. The problem is worse than just not being able to order the evacuated constituents correctly, there's no independently-motivated place for them to go! This problem is unchanged in a movement-and-deletion style analysis where, due to deletion being required to apply to whole XPs, the idea is to evacuate th surviving constituents out of the XP, while whatever remains ends up deleted. [6,23] This remains a problem even there as the initial movement is still problematic.

Thus, even if we were to take solace in the fact that Stripping does not introduce the vexing problem of a discontinuous FOCUS and ASSOCIATE in the same way that Gapping does, this analysis would still hit a dead end in precisely the same manner as described in Kubota and Levine's [17] rebuttal of this kind of analysis for Gapping. In short, despite the fact that Stripping only allows a single contiguous FOCUS , this Low-VP Coordination analysis is still equally unable to account for the required readings of wide and distributed scope.

(11) Kim didn't play BINGO **or** CHESS.
Distributed reading: $\neg(\text{play}(\text{bingo})(\text{k})) \vee \neg(\text{play}(\text{chess})(\text{k}))$



6 Hybrid Type-Logical Categorial Grammar

My analysis of English Stripping and the associated scope anomaly discussed earlier are presented using the Hybrid Type-Logical Categorial Grammar (HTLCG) framework. This section contains the minimum description needed to explain the layout of HTLCG and how it works. The reader is referred to Kubota & Levine, Hybrid Type Logical Categorial Grammar (ms., http://ling.auf.net/lingbuzz/002313) for a full formulation of the framework.

HTLCG is based on the Lambek Calculus [19], with one additional non-directional mode of implication, and developed in Kubota [11,15], and Kubota and Levine [12,13,14,16,17]. The flexible syntax-semantics interface of this system is useful for studying linguistic phenomena that have implications in both domains, such as coordination, scope, and ellipsis. Readers familiar with HTLCG may wish to skip straight to section 7.1.

Linguistics expressions in HTLCG are represented as tuples $\langle \phi; \sigma; \kappa \rangle$ where ϕ is the phonological string, σ is the semantic term,and κ is the syntactic type. In this framework, syntactic *type* is synonymous with syntactic *category*. Examples (12-a,b) below are NPs, (12-c) is a one-place predicate, and (12-d) is a two-place predicate.

(12) Sample Lexicon:
  a. John; j; NP
  b. bingo ; b; NP
  c. sleeps; sleep; NP\S
  d. eats; eat; (NP\S)/NP

The / and \ are the normal mode of Lambek directional implication where the argument falls under the slash and the functor is above. Thus A/B is an expression looking for an argument of type B on its right, while A\B denotes an expression looking for an argument of type A on it's left. In HTLCG there is one additional mode of implication, $\upharpoonright$, which is a directionless mode of implication similar to $\multimap$ in Curryesque categorial grammars. While both / and \ are directional modes of implication that are looking for adjacent peripheral arguments, $\upharpoonright$ is able to take arguments from anywhere, and is often used to denote continuations, an expression missing an argument from a medial position within itself, and other discontinuous linguistic expressions.

(13) HTLCG Elimination rules

$$\frac{\mathrm{a;\ F;\ A/B} \qquad \mathrm{b;\ G;\ B}}{\mathrm{a{\cdot}b;\ F(G);\ A}}\ /\mathrm{E} \qquad \frac{\mathrm{b;\ G;\ B} \qquad \mathrm{a;\ F;\ B\backslash A}}{\mathrm{b{\cdot}a;\ F(G);\ A}}\ \backslash\mathrm{E}$$

$$\frac{\mathrm{a;\ F;\ A{\upharpoonright}B} \qquad \mathrm{b;\ G;\ B}}{\mathrm{a(b);\ F(G);\ A}}\ {\upharpoonright}\mathrm{E}$$

The elimination rules are different modes of modus ponens. The /E rule allows a functor to take an argument on its right periphery, while the \E rule allows the same but on the left periphery. the $\upharpoonright$E rule allows the functor to take an appropriately typed argument from anywhere. While this may seem overly powerful, phonological string ordering is still maintained via functional prosody.[2] The · connective is for phonological string concatenation, and is associative in both directions.

(14) HTLCG Introduction Rules

$$\frac{\begin{array}{c}[\phi;\ \mathrm{x;\ A}]^{\mathrm{n}}\\ \vdots \quad \vdots \quad \vdots\\ \hline \mathrm{b}{\cdot}\phi;\ \mathrm{F;\ B}\end{array}}{\mathrm{b;\ \lambda x[F];\ B/A}}\ /\mathrm{I}^{\mathrm{n}} \qquad \frac{\begin{array}{c}[\phi;\ \mathrm{x;\ A}]^{\mathrm{n}}\\ \vdots \quad \vdots \quad \vdots\\ \hline \phi{\cdot}\mathrm{b;\ F;\ B}\end{array}}{\mathrm{b;\ \lambda x[F];\ A\backslash B}}\ \backslash\mathrm{I}^{\mathrm{n}}$$

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[2] One reviewer points out a potential problem with the underlying logic of the $\upharpoonright$ connective. As discussed in [25], it can allow for undesired overgeneration, particularly in cases such as determiner gapping and stripping. The problem is that the $\upharpoonright$E rule only requires that the syntactic categories match, and is insensitive to the end linear order resulting from prosodic function-application. This means that it does not necessarily require the end result of prosodic function-application to match the order of the hypothetical expressions used in the $\upharpoonright$I rule to derive the original continuation in the first place.
However, the author does not consider this criticism to be an existential threat to the present analysis for several reasons. First, while it is clear that the current formulation of the $\upharpoonright$, coupled with its use in some lexical entries, is problematic, further research is required to determine if this issue can be solved through minor tweaks to the system or if it will require wholesale revisions of the underlying logic. Secondly, the present analysis, though couched HTLCG, is readily adaptable into other CG and TLG frameworks, such as the Displacement Type-Logical Grammar of [24], as noted by Morrill and Valentin in [25]. Thus, even if this observation proves a major obstacle for HTLCG as a framework in its current form, it would not necessarily invalidate the results of the current analysis.

$$\dfrac{\dfrac{\begin{array}{c}[\phi;\ \mathrm{x};\ \mathrm{A}]^{\mathrm{n}}\\ \vdots \quad \vdots \quad \vdots\end{array}}{\mathrm{b};\ \mathrm{F};\ \mathrm{B}}}{\lambda\phi[\mathrm{b}];\ \lambda\mathrm{x}[\mathrm{F}];\ \mathrm{B}{\upharpoonright}\mathrm{A}}\ {\upharpoonright}\mathrm{I}^{\mathrm{n}}$$

The introduction rules enable hypothetical reasoning, and are typically considered more abstract and harder to intuit, but play an equally important role in the overall logic of the deductive system. For the purposes of the present analysis, the introduction rules are often used when type-raising and lowering linguistic expressions, and when deriving the signs corresponding to noncontiguous constituents, such as the aptly named <u>continuation</u> from (4-b) above, *Mary told...about the job*. To derive that expression, we could hypothesize an NP, for example, $[\phi;\ \mathrm{x};\ \mathrm{NP}]^{\mathrm{i}}$, where the superscript i is tracking the index of the hypothesized element. After using the elimination rules to derive the string *Mary·told·*ϕ*·about·the·job* of type S, we could use the ↾I rule to discharge our hypothesized NP and obtain the type of our continuation in (15), which denotes a discontiguous expression that would be an S, if it had a medial NP argument.

(15) $\lambda\phi$[Mary·told·ϕ·about·the·job]; λx[told(about job)(x)(m)]; S↾NP

There is a transparent syntax-semantics mapping from syntactic categories to semantic types in HTLCG. As issues related to the intensionality or extensionality of our semantics are not directly related to the problem of stripping, this analysis employs a fragment of standard extensional Montagovian model-theoretic semantics in the current analysis as described in Kubota and Levine [2014] and [2015a]:

(16) a. e and t are semantics types
b. if α and β are semantic types, then so is $\alpha \to \beta$
c. Nothing else is a semantic type

Syntactic categories are can be mapped to semantic types by a function SEM, defined below.

(17) a. SEM(NP) = e
b. SEM(S) = t
c. SEM($\mathrm{S}_{\mathrm{bse}}$) = t
d. SEM($\mathbb{W}$) = t
e. For any categories A and B:
(i) SEM(A/B) = SEM(B)→ SEM(A)
(ii) SEM(A\B) = SEM(A)→ SEM(B)
(iii) SEM(A↾B) = SEM(B)→ SEM(A)

In addition, for the phonological string, we can define a function SAY to map the syntactic category to a phonological type.

(18) a. For any atomic syntactic type A:
(i) SAY(A) = *string*

b. For any categories A and B:
   (i) SAY(A/B) = *string*
   (ii) SAY(A\B) = *string*
   (iii) SAY(A↾B) = SAY(B)→ SAY(A)

In the sections and analytical fragment that follows, I make use of the following variables in (19).

(19) a. Prosodic variables:
   (i) ϕ, ψ - *string*
   (ii) σ - *string* → *string*

b. Semantic Variables:
   (i) x, y, z - *e*
   (ii) P, Q - $e \rightarrow t$
   (iii) R - $(e \rightarrow t) \rightarrow (e \rightarrow t)$

In addition to the normal prosodic and semantic variables, HTLCG also includes metavariable over syntactic categories, as a kind of type schema. This allows HTLCG to capture certain empirical facts about language more efficiently by generalizing lexical entries. For instance, the category of conjunction in English is typically taken to be X\X/X. That is, something that, for any category X, returns an expression of type X if there is an expression of type X on its right and its left. Importantly, however, when such a lexical entry is introduced as part of a proof, all instances of the same metavariable receive the same category assignment. Thus the X\X/X entry for conjunction above could be realized in a proof as NP\NP/NP, S\S/S, or even (NP\N)\(NP\N)/(NP\N). However, NP\(NP\N)/(NP\N) would not be a legal type assignment, because it would require X to simultaneously be of type NP in one instance, and type NP\S in another.

We will use the following primitive syntactic categories for this fragment. NP is the syntactic category of Noun Phrases such as *John* and *bingo*. S is the syntactic category of tensed clauses, which are acceptable final outputs of the grammar. S_{bse} is the type of base or untensed clauses. Finally we have $\mathbb{W}$, a so-called "poltergeist category." $\mathbb{W}$ is a type that can be legally used in the course of a derivation, but there are no lexical constants of type $\mathbb{W}$, so it a useful, albeit uninhabited type, in the spirit of [26], though the actual implementation here is different from the original version in GPSP. $\mathbb{W}$ is a category that corresponds to Troelstra's 0 in intuitionist linear logic, representing multiplicative False in the syntax in HTLCG. [28] The grammar does not generate any signs of just category $\mathbb{W}$ in the lexicon, and the tecto logic of categories cannot prove $\mathbb{W}$. In effect, a derivation that results in a $\mathbb{W}$ indicates ungrammaticality.

7 HTLCG Analysis of Stripping

7.1 Basic Stripping

The following proof demonstrates how compositional meaning of a very simple Stripping sentence, *John slept, and Mary too* can be derived, and introduces the Stripping operator in (21) below. First the ASSOCIATE and FOCUS are fed to the Stripping operator, which in its current version is baked into the MAIN FUNCTOR. Then we feed the <u>continuation</u> to the **functor**, and β-reduce to distribute the semantics of the <u>continuation</u> to the two conjuncts.

In the phonological tuple, the Stripping operator in (20-d) takes in the ASSOCIATE before taking in the FOCUS and passing that string along to the <u>continuation</u>. In the semantics, the operator similarly takes both the ASSOCIATE and FOCUS, but in this case it passes both arguments along to the <u>continuation</u>, *slept*, in the final step of the derivation. In this way the operator obtains the desired surface string and semantic denotation of Stripping by distributing the meaning of the <u>continuation</u> to both conjuncts, without a corresponding symmetric appearance of the phonological string.

(20) John slept, and Mary, too.

a. John; j; NP

b. Mary; m; NP

c. slept; sleep; NP\S from which we can freely derive[3]:

   (i) $\lambda\phi[\phi\cdot\text{slept}]$; $\lambda y[\text{sleep}(y)]$; S↾NP

d. $\lambda\phi\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{and}\cdot\phi\cdot\text{too}]$; $\lambda y\lambda x\lambda P[P(x)\wedge P(y)]$; Y↾(Y↾X)↾X↾X

(21)

$$\dfrac{\dfrac{\text{John; j; NP} \qquad \dfrac{\begin{matrix}\lambda\phi\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{and}\cdot\phi\cdot\text{too}];\\ \lambda y\lambda x\lambda P[P(x)\wedge P(y)];\\ S\upharpoonright(S\upharpoonright NP)\upharpoonright NP\upharpoonright NP\end{matrix} \qquad \begin{matrix}\text{Mary;}\\ \text{m;}\\ \text{NP}\end{matrix}}{\begin{matrix}\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{and}\cdot\text{Mary}\cdot\text{too}];\\ \lambda x\lambda P[P(x)\wedge P(m)];\\ S\upharpoonright(S\upharpoonright NP)\upharpoonright NP\end{matrix}}\upharpoonright E}{\begin{matrix}\lambda\sigma\cdot[\sigma(\text{John})\cdot\text{and}\cdot\text{Mary}\cdot\text{too}];\\ \lambda P[P(j)\wedge P(m)];\\ S\upharpoonright(S\upharpoonright NP)\end{matrix}}\upharpoonright E \qquad \begin{matrix}\lambda\phi[\phi\cdot\text{slept}];\\ \lambda y[\text{sleep}(y)];\\ S\upharpoonright NP\end{matrix}}{\text{John}\cdot\text{slept}\cdot\text{and}\cdot\text{Mary}\ \cdot\text{too; sleep(j)}\wedge\text{sleep(m); S}}\upharpoonright E$$

We now turn to negation Stripping, as in (22) below. As in the case of conjunction Stripping, this kind of Stripping sentence can also be compositionally derived in a straightforward manner with only minor changes to the phonological and semantic tuples of the Stripping operator's lexical entry. Similarly to the

[3] This vertically-slashed version of *slept* can be derived simply via hypothetical reasoning:

$$\dfrac{\dfrac{[\phi;\ y;\ \text{NP}]^i \qquad \text{slept; sleep; NP}\backslash\text{S}}{\phi\cdot\text{slept; sleep(y); S}}}{\lambda\phi[\phi\cdot\text{slept}];\ \lambda y[\text{sleep}(y)];\ S\upharpoonright NP}\upharpoonright I^i$$

conjunction Stripping derivation, we first feed the ASSOCIATE and FOCUS to the operator built into the MAIN FUNCTOR, before feeding in the CONTINUATION, and then β-reducing to obtain our final sentence.

(22) John slept, not Mary.

a. $\lambda\phi\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{not}\cdot\phi]$; λyλxλP[P(x)∧¬P(y)]; Y↾(Y↾X)↾X↾X

$\lambda\phi\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{not}\cdot\phi]$; λyλxλP[P(x)∧¬P(y)]; S↾(S↾NP)↾NP↾NP   Mary; m; NP
——————————————— ↾E
$\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{not}\cdot\text{Mary}]$; λxλP[P(x)∧¬P(m)]; S↾(S↾NP)↾NP

John; j; NP $\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{not}\cdot\text{Mary}]$; λxλP[P(x)∧¬P(m)]; S↾(S↾NP)↾NP
——————————————— ↾E
$\lambda\sigma\cdot[\sigma(\text{John})\cdot\text{not}\cdot\text{Mary}]$; λP[P(j)∧¬P(m)]; S↾(S↾NP)

$\lambda\sigma\cdot[\sigma(\text{John})\cdot\text{not}\cdot\text{Mary}]$; λP[P(j)∧¬P(m)]; S↾(S↾NP) $\lambda\phi[\phi\cdot\text{slept}]$; λy[sleep(y)]; S↾NP
——————————————— ↾E
John·slept·not·Mary]; sleep(j)∧¬sleep(m); S

Similarly to the two above examples, other kinds of basic Stripping constructions such as those below in (23) can be derived with only minor tweaks to the Stripping operator.

(23)
a. John slept, and Mary.
b. John slept, or Mary.
c. Either John slept, or Mary.
d. Neither John slept, nor Mary.
e. John slept, then Mary.

This analysis for stripping also obtains for object and medial stripping, as demonstrated below for medial object stripping, which cannot otherwise be straightforwardly captured by a coordination analysis. First, we derive the <u>continuation</u>, Mary edited ϕ in the park. Then we feed the ASSOCIATE and FOCUS to the Stripping operator as before, and finally combine to derive an S.

(24) Mary edited the paper in the park, and the journal, too.

(25)

edited; edit; (NP\S)/NP $[\phi; \text{x}; \text{NP}]^{\text{i}}$
——————————————— /E
edited·ϕ; edit(x); NP\S

edited·ϕ; edit(x); NP\S   in·the·park; inpark; (NP\S)\(NP\S)
——————————————— \E
edited·ϕ·in·the·park; inpark(edit(x)); NP\S

Mary; m; NP   edited·ϕ·in·the·park; inpark(edit(x)); NP\S
——————————————— \E
Mary·edited·ϕ·in·the·park; inpark(edit(x)(m)); S
——————————————— $\upharpoonright\text{I}^{\text{i}}$
$\lambda\phi$[Mary·edited·ϕ·in·the·park]; λx[inpark(edit(x)(m))]; S↾NP

(26)

$$\dfrac{\begin{array}{c}\text{the}\cdot\text{paper};\\ \text{paper};\\ \text{NP}\end{array} \quad \dfrac{\begin{array}{c}\lambda\phi\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{and}\cdot\phi\cdot\text{too}];\\ \lambda y\lambda x\lambda P[P(x)\wedge P(y)];\\ S\upharpoonright(S\upharpoonright NP)\upharpoonright NP\upharpoonright NP\end{array} \quad \begin{array}{c}\text{the}\cdot\text{journal};\\ \text{journal};\\ \text{NP}\end{array}}{\begin{array}{c}\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{and}\cdot\text{the}\cdot\text{journal}\cdot\text{too}];\\ \lambda x\lambda P[P(x)\wedge P(\text{journal})];\\ S\upharpoonright(S\upharpoonright NP)\upharpoonright NP\end{array}}\upharpoonright E}{\begin{array}{c}\lambda\sigma[\sigma(\text{the}\cdot\text{paper})\cdot\text{and}\cdot\text{the}\cdot\text{journal}\cdot\text{too}];\\ \lambda P[P(\text{paper})\wedge P(\text{journal})];\\ S\upharpoonright(S\upharpoonright NP)\end{array}}\upharpoonright E$$

(27)

$$\dfrac{\begin{array}{c}\lambda\phi[\text{Mary}\cdot\text{edited}\cdot\phi\cdot\text{in}\cdot\text{the}\cdot\text{park}];\\ \lambda x[\text{inpark}(\text{edit}(x)(m))];\\ S\upharpoonright NP\end{array} \quad \begin{array}{c}\lambda\sigma[\sigma(\text{the}\cdot\text{paper})\cdot\text{and}\cdot\text{the}\cdot\text{journal}\cdot\text{too}];\\ \lambda P[P(\text{paper})\wedge P(\text{journal})];\\ S\upharpoonright(S\upharpoonright NP)\end{array}}{\begin{array}{c}\text{Mary}\cdot\text{edited}\cdot\text{the}\cdot\text{paper}\cdot\text{in}\cdot\text{the}\cdot\text{park}\cdot\text{and}\cdot\text{the}\cdot\text{journal}\cdot\text{too};\\ \text{inpark}(\text{edit}(\text{paper})(m))\wedge\text{inpark}(\text{edit}(\text{journal})(m));\\ S\end{array}}$$

7.2 Wide scope of Negation

This section briefly presents derivations of the following sentences in (28) to build up to a proper analysis of Stripping sentences with wide scope negation under disjunction.

Derivations are provided below for the following examples in order of increasing complexity.

(28)
a. John didn't sleep.
b. John didn't sleep, or Mary.

We then consider wide-scope negation under disjunction demonstrating an approach to negation, which is applicable more generally than in (22) above, where negation was built into the **functor**. To this end, we adopt an analysis of negation similar to the prior analyses of modal auxiliaries as VP/VP operators along the lines of [17], and [27], in the tradition of Bach [1,2,3], yielding a straightforward integration of modals into the current analysis. To demonstrate this consider the derivation below of the sentence in (28-a).

(29) Lexical entry for Auxiliaries:
$\lambda\sigma[\sigma(\text{didn't})]$; $\lambda\mathfrak{F}[\neg\mathfrak{F}(\lambda P[P])]$; $S\upharpoonright(\mathbb{W}\upharpoonright((NP\backslash\mathbb{W})/(NP\backslash S_{bse})))$

Example (29) above is our lexical entry for the auxiliary *didn't*. As mentioned previously, if one is not concerned with agreement, it's possible for the purposes of this analysis to think of $\mathbb{W}$ as a funny looking S_{bse}, in which case the syntactic type of the above auxiliary resembles the more familiar $S\upharpoonright((S_{bse}\upharpoonright(NP\backslash S_{bse})/(NP\backslash S_{bse})))$, an expression that returns an S if given something that would be an S_{bse} but is missing a $(NP\backslash S_{bse})/(NP\backslash S_{bse})$ modifier in some medial position. In the proof of (28-a) below, we can see how this auxiliary can be used in a normal sentence without stripping or other ellipsis. We first posit ϕ, a hypothetical Verb Phrase modifier, and combine it with *sleep* and *John*, before we then discharge that hypothesis via $\upharpoonright$I to obtain a continuation $\lambda\phi[\text{John}\cdot\phi\cdot\text{sleep}]$. This expression is then taken as an argument by the higher order auxiliary. An alternative proof strategy is, rather than type-raising *John... sleep*, to instead lower *didn't* into a lower-order (ie Lambek-slashed) category as demonstrated later on in (36).

(30) Derivation of (28-a) *John didn't sleep.*

$$\dfrac{\begin{array}{c}\lambda\sigma[\sigma(\text{didn't})];\\ \lambda\mathfrak{F}[\neg\mathfrak{F}(\lambda \mathrm{P}[\mathrm{P}])];\\ \mathrm{S}{\upharpoonright}(\mathbb{W}{\upharpoonright}((\mathrm{NP}\backslash\mathbb{W})/(\mathrm{NP}\backslash \mathrm{S}_{\mathrm{bse}})))\end{array} \quad \dfrac{\dfrac{\begin{array}{c}\text{John};\\ \mathrm{j};\\ \mathrm{NP}\end{array} \quad \dfrac{\begin{array}{c}[\phi;\\ R;\\ (\mathrm{NP}\backslash\mathbb{W})/(\mathrm{NP}\backslash \mathrm{S}_{\mathrm{bse}})]^a\end{array} \quad \begin{array}{c}\text{sleep};\\ \text{sleep};\\ (\mathrm{NP}\backslash \mathrm{S}_{\mathrm{bse}})\end{array}}{\phi\cdot\text{sleep};\ R(\text{sleep});\ (\mathrm{NP}\backslash\mathbb{W})}\,/E}{\text{John}\cdot\phi\cdot\text{sleep};\ R(\text{sleep}(\mathrm{j}));\ \mathbb{W}}\,\backslash E}{\lambda\phi[\text{John}\cdot\phi\cdot\text{sleep}];\ \lambda R[R(\text{sleep}(\mathrm{j}))];\ \mathbb{W}{\upharpoonright}((\mathrm{NP}\backslash\mathbb{W})/(\mathrm{NP}\backslash \mathrm{S}_{\mathrm{bse}}))}\,{\upharpoonright}I^a}{\text{John}\cdot\text{didn't}\cdot\text{sleep};\ \neg(\text{sleep}(\mathrm{j}));\ \mathrm{S}}\,{\upharpoonright}E$$

All necessary elements are now available to derive a proof of (28-b) *John didn't sleep or Mary* using a disjunction version of the Stripping operator from Section 1 above:

(31) $\lambda\phi\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{or}\cdot\phi];\ \lambda \mathrm{y}\lambda \mathrm{x}\lambda \mathrm{P}[\mathrm{P}(\mathrm{x})\vee \mathrm{P}(\mathrm{y})];\ \mathrm{Y}{\upharpoonright}(\mathrm{Y}{\upharpoonright}\mathrm{X}){\upharpoonright}\mathrm{X}{\upharpoonright}\mathrm{X}$

Since we are Stripping again now, we need a vertically-slashed type predicate with the appropriate arguments to be saturated later on via hypothetical reasoning.

(32)
$$\dfrac{\dfrac{\begin{array}{c}[\psi;\\ \mathrm{x};\\ \mathrm{NP}]^b\end{array} \quad \dfrac{\begin{array}{c}[\phi;\\ R;\\ (\mathrm{NP}\backslash\mathbb{W})/(\mathrm{NP}\backslash \mathrm{S}_{\mathrm{bse}})]^a\end{array} \quad \begin{array}{c}\text{sleep};\\ \text{sleep};\\ (\mathrm{NP}\backslash \mathrm{S}_{\mathrm{bse}})\end{array}}{\phi\cdot\text{sleep};\ R(\text{sleep});\ (\mathrm{NP}\backslash\mathbb{W})}\,/E}{\psi\cdot\phi\cdot\text{sleep};\ R(\text{sleep})(\psi);\ \mathbb{W}}\,\backslash E}{\lambda\psi[\psi\cdot\phi\cdot\text{sleep}];\ \lambda \mathrm{x}[R(\text{sleep}(\mathrm{x}))];\ \mathbb{W}{\upharpoonright}\mathrm{NP}}\,{\upharpoonright}I^b$$

We supply signs corresponding to the FOCUS and ASSOCIATE to the Stripping operator, and then pick up the $\mathbb{W}{\upharpoonright}\mathrm{NP}$-typed predicate to yield *John* ϕ *sleep or Mary*. We then need to discharge the other assumed $(\mathrm{NP}\backslash\mathbb{W})/(\mathrm{NP}\backslash \mathrm{S}_{\mathrm{bse}})$ expression to obtain a syntactic type that *didn't* is looking for.

(33)
$$\dfrac{\dfrac{\begin{array}{c}\lambda\psi[\psi\cdot\phi\cdot\text{sleep}];\\ \lambda \mathrm{x}[R(\text{sleep}(\mathrm{x}))];\\ \mathbb{W}{\upharpoonright}\mathrm{NP}\end{array} \quad \dfrac{\begin{array}{c}\text{John};\\ \mathrm{j};\\ \mathrm{NP}\end{array} \quad \dfrac{\begin{array}{c}\text{Mary};\\ \mathrm{m};\\ \mathrm{NP}\end{array} \quad \begin{array}{c}\lambda\phi\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{or}\cdot\phi];\\ \lambda \mathrm{y}\lambda \mathrm{x}\lambda \mathrm{P}[\mathrm{P}(\mathrm{x})\vee \mathrm{P}(\mathrm{y})];\\ \mathbb{W}{\upharpoonright}(\mathbb{W}{\upharpoonright}\mathrm{NP}){\upharpoonright}\mathrm{NP}{\upharpoonright}\mathrm{NP}\end{array}}{\begin{array}{c}\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{or}\cdot\text{Mary}];\\ \lambda \mathrm{x}\lambda \mathrm{P}[\mathrm{P}(\mathrm{x})\vee \mathrm{P}(\mathrm{m})];\\ \mathbb{W}{\upharpoonright}(\mathbb{W}{\upharpoonright}\mathrm{NP}){\upharpoonright}\mathrm{NP}\end{array}}\,{\upharpoonright}E}{\begin{array}{c}\lambda\sigma[\sigma(\text{John})\cdot\text{or}\cdot\text{Mary}];\\ \lambda \mathrm{P}[\mathrm{P}(\mathrm{j})\vee \mathrm{P}(\mathrm{m})];\\ \mathbb{W}{\upharpoonright}(\mathbb{W}{\upharpoonright}\mathrm{NP})\end{array}}\,{\upharpoonright}E}{\text{John}\cdot\phi\cdot\text{sleep}\cdot\text{or}\cdot\text{Mary};\ R(\text{sleep}(\mathrm{j}))\vee R(\text{sleep}(\mathrm{m}))\ \mathbb{W}}}{\lambda\phi[\text{John}\cdot\phi\cdot\text{sleep}\cdot\text{or}\cdot\text{Mary}];\ \lambda R[R(\text{sleep}(\mathrm{j}))\vee R(\text{sleep}(\mathrm{m}))];\ \mathbb{W}{\upharpoonright}((\mathrm{NP}\backslash\mathbb{W})/(\mathrm{NP}\backslash \mathrm{S}_{\mathrm{bse}}))}\,{\upharpoonright}I^a$$

The VP operator *didn't* then combines with the sign derived in (33), yielding the correct semantics for (28-b).

(34)

$$\frac{\begin{array}{c}\lambda\sigma[\sigma(\text{didn't})];\\ \lambda\mathfrak{F}[\neg\mathfrak{F}(\lambda \mathrm{P}[\mathrm{P}])];\\ \mathrm{S}\upharpoonright(\mathbb{W}\upharpoonright((\mathrm{NP}\backslash\mathbb{W})/(\mathrm{NP}\backslash\mathrm{S}_{\mathrm{bse}})))\end{array} \qquad \begin{array}{c}\lambda\phi[\text{John}\cdot\phi\cdot\text{sleep}\cdot\text{or}\cdot\text{Mary}];\\ \lambda R[R(\text{sleep})(\text{j})\vee R(\text{sleep})(\text{m})];\\ \mathbb{W}\upharpoonright((\mathrm{NP}\backslash\mathbb{W})/(\mathrm{NP}\backslash\mathrm{S}_{\mathrm{bse}}))\end{array}}{\begin{array}{c}\text{John}\cdot\text{didn't}\cdot\text{sleep}\cdot\text{or}\cdot\text{Mary};\\ \neg(\text{sleep}(\text{j})\vee\ \text{sleep}(\text{m}));\\ \mathrm{S}\end{array}}$$

Finally, suppose we wanted to derive the other version of (28-b), but with the distributed-scope negation reading, as in (35-b) below:

(35)
a. John didn't sleep or Mary.
b. $\neg\text{sleep(j)} \vee \neg\text{sleep(m)}$

This is not a problem for my analysis, and falls out naturally from the lexicon and fragment presented thus far. We are simply required to derive a lower-order version of the auxiliary.

Deriving Lower-Order Auxiliaries. In HTLCG, we can derive a lower-order version of our (by default) higher-order VP/VP auxiliaries by hypothesizing the needed arguments, and then discharging those hypotheses on the periphery. Kubota and Levine [2016] contains an identical derivation in their appendices, demonstrating how to lower the modal auxiliary. I repeat it here for convenience.

HTLCG assumes that modal auxiliaries are higher-order Verb Phrase modifiers. As demonstrated in section 6.2, this higher-order entry yields the wide-scope modal and negation semantics and partially solves the problem of anomalous scope. But oftentimes a lower-order version of these same modals are required, such as in cases of distributed scope. However, this does not require HTLCG to have two different entries for auxiliaries. Rather, the lower-order version can be derived as a theorem from the higher-order entry via hypothetical reasoning.

In the place of *john* and *sleep* in (36), we posit variables to derive an expression of type $\mathbb{W}\upharpoonright((\mathrm{NP}\backslash\mathbb{W})/(\mathrm{NP}\backslash\mathrm{S}_{\mathrm{bse}}))$ which then combines with our higher-order auxiliary to yield an S. Then, by directional slash elimination, we derive an expression of type NP\S. finally, with one more directional slash introduction, we obtain $(\mathrm{NP}\backslash\mathrm{S})/(\mathrm{NP}\backslash\mathrm{S}_{\mathrm{bse}})$,the type of lower-order auxiliary.

(36)

$$
\dfrac{
  \dfrac{
    \dfrac{
      \dfrac{
        \lambda\sigma[\sigma(\text{didn't})];\ \lambda\mathfrak{F}[\neg\mathfrak{F}(\lambda P[P])];\ S\upharpoonright(\mathbb{W}\upharpoonright((NP\backslash\mathbb{W})/(NP\backslash S_{bse})))
        \quad
        \dfrac{
          \dfrac{
            [\phi;\ x;\ NP]^a
            \quad
            \dfrac{[\phi;\ R;\ (NP\backslash\mathbb{W})/(NP\backslash S_{bse})]^b \quad [\phi;\ Q;\ (NP\backslash S_{bse})]^c}{\phi^b\cdot\phi^c;\ R(Q);\ (NP\backslash\mathbb{W})}
          }{\phi^a\cdot\phi^b\cdot\phi^c;\ R(Q)(x);\ \mathbb{W}}
        }{\lambda\phi^b[\phi^a\cdot\phi^b\cdot\phi^c];\ \lambda R[R(Q)(x)];\ \mathbb{W}\upharpoonright((NP\backslash\mathbb{W})/(NP\backslash S_{bse}))}\upharpoonright I^b
      }{\dfrac{\lambda\phi^b[\phi^a\cdot\phi^b\cdot\phi^c]\ (\text{didn't});\ \neg\lambda R[R(Q)(x)](\lambda P[P]);\ S}{\phi^a\cdot\text{didn't}\cdot\phi^c;\ \neg\lambda P[P](Q)(x);\ S}\ \beta\Rightarrow}
    }{\phi^a\cdot\text{didn't}\cdot\phi^c;\ \neg Q(x);\ S}\ \beta\Rightarrow
  }{\text{didn't}\cdot\phi^c;\ \lambda x[\neg Q(x)];\ NP\backslash S}\backslash I^a
}{\text{didn't};\ \lambda Q\lambda x[\neg Q(x)];\ (NP\backslash S)/(NP\backslash S_{bse})}/I^c
$$

With the lower-order auxiliary in hand as a theorem of the higher-order lexical entry and the inference rules of HTLCG, we straightforwardly obtain the distributed reading of negation and modals in Stripping.

First we once again derive the vertically-slashed type of *sleep*, but this time our hypothetical auxiliary is $(NP\backslash S)/(NP\backslash S_{bse})$ rather than $(NP\backslash\mathbb{W})/(NP\backslash S_{bse})$:

(37)

$$
\dfrac{
  \dfrac{
    [\psi;\ x;\ NP]^b
    \quad
    \dfrac{[\phi;\ R;\ (NP\backslash S)/(NP\backslash S_{bse})]^a \quad \text{sleep};\ \text{sleep};\ (NP\backslash S_{bse})}{\phi\cdot\text{sleep};\ R(\text{sleep});\ NP\backslash S}
  }{\psi\cdot\phi\cdot\text{sleep};\ R(\text{sleep})(x);\ S}
}{\lambda\psi[\psi\cdot\phi\cdot\text{sleep}];\ \lambda x[R(\text{sleep})(x)];\ S\upharpoonright NP}\upharpoonright I^b
$$

We then feed our FOCUS, ASSOCIATE, and verb to the Stripping operator, and β-reduce, exactly the same as in (33) above.

(38)

$$
\dfrac{
  \dfrac{
    \dfrac{
      \lambda\psi[\psi\cdot\phi\cdot\text{sleep}];\ \lambda x[R(\text{sleep})(x)];\ S\upharpoonright NP
      \quad
      \dfrac{
        \text{John};\ j;\ NP
        \quad
        \dfrac{\text{Mary},\ m,\ NP \quad \lambda\phi\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{or}\cdot\phi];\ \lambda y\lambda x\lambda P[P(x)\vee P(y)];\ S\upharpoonright(S\upharpoonright NP)\upharpoonright NP\upharpoonright NP}{\lambda\psi\lambda\sigma[\sigma(\psi)\cdot\text{or}\cdot\text{Mary}];\ \lambda x\lambda P[P(x)\vee P(m)];\ S\upharpoonright(S\upharpoonright NP)\upharpoonright NP}
      }{\lambda\sigma[\sigma(\text{John})\cdot\text{or}\cdot\text{Mary}];\ \lambda P[P(j)\vee P(m)];\ S\upharpoonright(S\upharpoonright NP)}
    }{\lambda\psi[\psi\cdot\phi\cdot\text{sleep}](\text{John})\cdot\text{or}\cdot\text{Mary};\ \lambda x[R(\text{sleep})(x)](j)\vee\lambda x[R(\text{sleep})(x)](m);\ S}
  }{\text{John}\cdot\phi\cdot\text{sleep}\cdot\text{or}\cdot\text{Mary};\ R(\text{sleep})(j)\vee R(\text{sleep})(m);\ S}\ \beta\Rightarrow
}{\lambda\phi[\text{John}\cdot\phi\cdot\text{sleep}\cdot\text{or}\cdot\text{Mary}];\ \lambda R[R(\text{sleep})(j)\vee R(\text{sleep})(m)];\ S\upharpoonright((NP\backslash S)/(NP\backslash S_{bse}))}\upharpoonright I^a
$$

Now we simply combine our continuation with the regular VP/VP auxiliary, to get the distributed-scope negation reading.

(39)

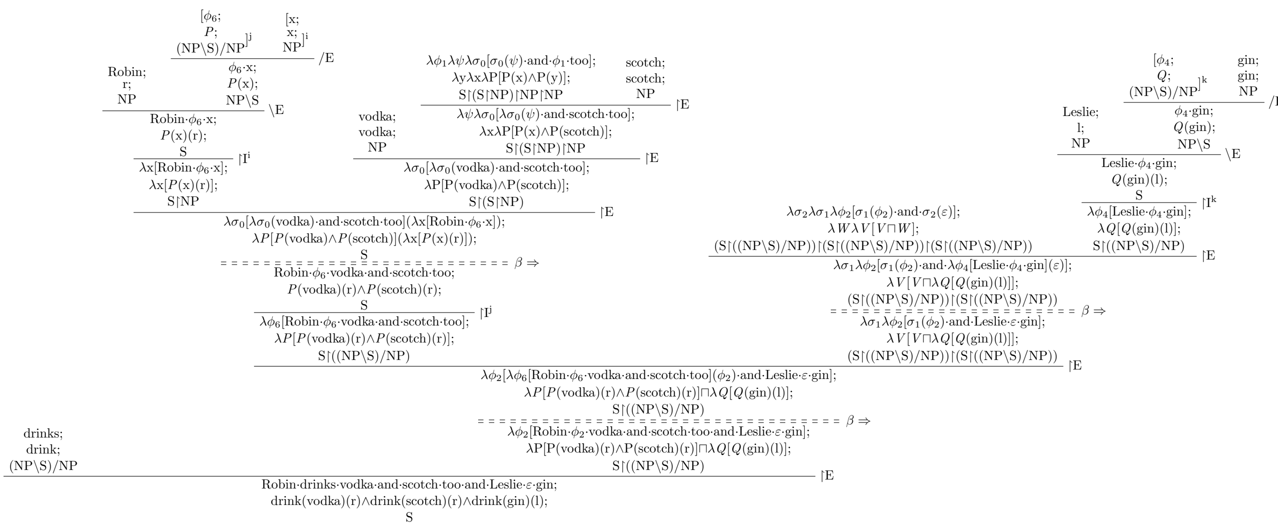
$$
\dfrac{
  \text{didn't};\ \lambda Q\lambda x[\neg Q(x)];\ ((NP\backslash S)/(NP\backslash S_{bse}))
  \quad
  \lambda\phi[\text{John}\cdot\phi\cdot\text{sleep}\cdot\text{or}\cdot\text{Mary}];\ \lambda R[R(\text{sleep})(j)\vee R(\text{sleep})(m)];\ S\upharpoonright((NP\backslash S)/(NP\backslash S_{bse}))
}{\text{John}\cdot\text{didn't}\cdot\text{sleep}\cdot\text{or}\cdot\text{Mary};\ \neg\text{sleep}(j)\vee\neg\text{sleep}(m)];\ S}
$$

7.3 Strip-Gapping

One prediction of this analysis is that there is nothing stopping one from Gapping with a Stripping sentence functioning as one of the conjuncts, and indeed this kind of sentence does appear to exist, as in (40) below. *Robin drinks vodka, and scotch too* can be treated as a straightforward Strip, the likes of which we have already seen before. *Robin drinks vodka, and Leslie, gin* also looks like a normal Gapping sentence. We know how to handle those too. The trick is to derive the Stripping sentence such that it ends up as something of type S↾((NP\S)/NP), or in other words, something that would be a sentence if its gap for a medial transitive verb were filled.

The way to do this is relatively simple. Just Strip as normal, but with the exception of using a dummy hypothetical transitive verb instead of "drinks" for the time being. Lambda abstract out the dummy verb at the end of the Stripping operation to obtain the requisite expression of type S↾((NP\S)/NP). Secondly, derive *Leslie...gin* as usual in the Gapping analysis put forth in Kubota and Levine 2016, to also obtain an expression of type S↾((NP\S)/NP). Then, those two expressions are combined using the Gapping operator from Kubota and Levine 2016. Finally, feed in the transitive verb "drink", resolve the generalized conjunction, and β-reduce.

(40) Robin drinks vodka, and scotch too, and Leslie, gin.



8 Conclusion and Discussion

The analysis presented here extends the analysis of Kubota and Levine's analysis of Gapping in 17 to cover many common forms of stripping, another kind of ellipsis, and shows backwards-compatibility by also obtaining proofs for combined strip-gap sentences. Interestingly, this approach also makes obvious the fact that stripping parallels gapping with respect to the availability of anomalous scope, where certain semantic operators can scope out of their conjunct to take scope over the entire conjunction or disjunction. While this paper cannot give a full account of this phenomenon, evidence from Stripping gives us a larger empirical space in which investigate this fascinating conundrum. In closing, however, there are several minor observations to make about the problem of anomalous scope at this point.

First, as mentioned before, this phenomenon is not restricted to stripping. Example (41-a) demonstrates that similar cases are found in Gapping sentences, a discussion of which can be found in Kubota and Levine [2016]. Example (41-b) is a non-ellipsis example of a raising-to-subject predicate, which also exhibits this behavior.

(41) a. John can't eat pizza, or Charlie fish.
   (i) $\neg\Diamond(\text{eat(pizza)(john)} \vee \text{(eat(fish)(charlie)))}$
b. A donkey probably brayed.
   (i) probably(brayed(donkey))

Similarly, the fact that most examples in this paper have dealt with negation scoping wide over disjunction should not be taken to mean that that is the sole case of the phenomenon. In contrast, (42-a) and (42-b) demonstrate that aside from negation, other modal auxiliaries also demonstrate the same anomalous scoping behavior. Similarly, (42-c) shows that negation can scope wide over conjunction as well as disjunction.

(42) a. Kim should mow the lawn, or Sandy. - Wide scope necessity
b. Kim probably mowed the lawn, or Sandy. - Wide scope possibility
c. The Republican can't win the special election and the Democrat too. - Wide scope possibility over conjunction[4]

In addition, there is still plenty of work to be done in relation to the Stripping as well, such as generalizing the Stripping operator, which will involve a formal analysis of the set of possible main functors, a set that only partially overlaps with the possible functors in Gapping. Similarly, a comprehensive analysis of stripping would have to account for the existance of intersentential Stripping, Sprouting, and stripping of embedded subjects, as in (43-a), (43-b), and (43-c) below, respectively.

(43) a. A: Who went to the store? B: Not John! - Inter-sentential Stripping
b. I have traveled extensively in my time, but not to Bali. - Sprouting
c. John would go to the movies with Linda, but I very much doubt anyone else. - Sprouting from Embedded Context

[4] Thanks are due to Carl Pollard for these examples.

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