The Logicality of Language: A new take on Triviality, "Ungrammaticality", and Logical Form *

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Abstract

Recent work in formal semantics suggests that the language system includes not only a structure building device, as standardly assumed, but also a natural deductive system which can determine when expressions have trivial truth-conditions (e.g., are logically true/false) and mark them as unacceptable. This hypothesis, called the 'logicality of language', accounts for many acceptability patterns, including systematic restrictions on the distribution of quantifiers. To deal with apparent counter-examples consisting of acceptable tautologies and contradictions, the logicality of language is often paired with an additional assumption according to which logical forms are radically underspecified: i.e., the language system can see functional terms but is 'blind' to open class terms to the extent that different tokens of the same term are treated as if independent. This conception of logical form has profound implications: it suggests an extreme version of the modularity of language, and can only be paired with non-classical—indeed quite exotic—kinds of deductive systems. The aim of this paper is to show that we can pair the logicality of language with a different and ultimately more traditional account of logical form. This framework accounts for the basic acceptability patterns which motivated the logicality of language, can explain why some tautologies and contradictions are acceptable, and makes better predictions in key cases. As a result, we can pursue versions of the logicality of language in frameworks compatible with the view that language system is not radically modular vis-á-vis its open class terms and employs a deductive system that is basically classical.

Keywords: logical form, triviality, quantifiers, contradictions, tautologies, natural logic, modularity. **Words:** 11,773

1 Introduction

One of the most important recent hypothesis about the computational architecture of language is that it consists not only of (i) a structure building device (e.g., 'Merge' + the corresponding semantic operations), but also of (ii) a 'natural logic' or automatic deductive system. We shall call the view that (i) and (ii) work together to determine the set of acceptable expressions of natural languages, the 'logicality of language' (Fox 2000; Fox & Hackl 2007; Chierchia 2006, 2013; Abrusán 2011a, 2014). The question explored in this paper

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is: What notion of logical form should we pair with the logicality of language? The term 'logical form' is used here in its broad descriptive sense. As a starting point, we can say that the 'logical form' of an expression is the underlying representation which is the input to its semantic interpretation. At this level, ambiguities are resolved and semantic values can be assigned to complex expressions as a function of those assigned to their constituents (Heim & Kratzer 1998; Fox 2003). Accordingly, our main question can be reformulated as follows: to develop a defensible version of the logicality of language, what kinds of revisions do we need to make to the standard conception of logical form? The answer to this question will determine not only the ultimate viability of the logicality of language hypothesis, but also its implications to various foundational issues such as the degree of modularity of the language system and the nature of its interface with our general reasoning capacities.[1]

To appreciate the importance of this issue, we begin by briefly describing why theorists have proposed the logicality of language. Two observation are crucial. First, some robust acceptability patterns cannot be explained purely syntactically. Important examples include systematic restrictions on the kinds of quantifiers that can occur with exceptive phrases, illustrated in (1), and *there*-existentials, illustrated in (2). Second, given independently plausible logical forms and interpretations for the functional terms, the unacceptable examples in each pair can be shown to be trivial: i.e., in all worlds or situations, (1-a) is false and (2-a) is true.

(1) a. *Few students but Sue passed the exam.
b. All students but Sue passed the exam.

(2) a. *There is every red apple.
b. There is a red apple.

As we review in §2, this kind of triviality underwrites various general semantic restrictions on the distribution of quantificational determiners, among other systematic acceptability patterns (Gajewski 2002, 2009; Fox & Hackl 2007; Chierchia 2006, 2013; Abrusán 2014). It follows that we can explain these patterns if we accept the logicality of language, i.e., the hypothesis that the language system works with a deductive system that can automatically compute whether, and filter-out when, an expression is trivial (true/false in all worlds or situations).

As it stands, however, the logicality of language raises an obvious worry (see e.g., Fox & Hackl 2007; Gajewski 2002, 2009; Chierchia 2013). If the deductive system marks as ungrammatical or unacceptable trivial sentences such as (1-a)-(2-a), why are apparently simpler examples of triviality, such as the contradictions and tautologies in (3), perfectly acceptable?

(3) a. It is raining and it is not raining.
b. If John is wrong, then John is wrong.

1 Terminological note. Most philosophers distinguish between two broad notions of 'logical form' (see e.g., Stanley 2000; Szabó 2012; Iacona 2017). In its 'descriptive' sense—which is the primary focus in this paper—the 'logical form' of an expression is a level of representation that is the input to semantic interpretation. In its second, 'revisionary' sense, 'logical forms' are formulae in artificial languages which, for scientific or other investigations, we can assign to expressions of natural languages. Depending on the goals, we can choose different regimentations. We are not directly concerned with 'logical forms' in this second sense. Still, since a major project of linguistic semantics is to model why native speakers find certain inferences bad or compelling, the two notions can be intimately connected. Indeed, some philosophers have searched for a unified conception (for critical discussion see Szabó 2012 and Iacona 2017).

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Indeed, communication with such superficially trivial expressions is not uncommon. Furthermore, we can imagine a language device which, being paired with an automatic and unforgiving deductive system, would force us to rescue expressions like those in (3) by overtly modifying at least one of the problematic predicates, as in *it is raining and it is not raining hard* and *if John is somewhat wrong, then John is totally wrong*. How, then, can we reconcile the presumed logicality of language, so as to account for the patterns in (1)-(2), with the ubiquity of acceptable trivial sentences such as those in (3)?[2]

In response to this challenge, most proponents of the logicality of language add to the basic framework the following hypothesis: the deductive system operates on logical forms which are radically underspecified with respect to the content of their non-logical terms (Gajewski 2002; Fox & Hackl 2007; Chierchia 2006, 2013). This hypothesis is often attributed to Gajewski (2002, 2008b, 2009), who proposed one of its most simple and elegant formulations:

(4) **Logical Skeletons**

a. The subset of the trivial sentences which are unacceptable is formally definable by the configuration of their functional terms at logical form. Call these 'L-trivial'.

b. Language and its deductive system 'see' only 'logical skeletons': representations that are underspecified with respect to the content of their non-logical expressions.

c. Logical skeletons treat all tokens of non-logical expressions as independent—even tokens of the same expression.

The basic idea is that if we accept Logical skeletons, as defined in (4), we can explain key patterns of semantic restrictions on quantifiers, such as those illustrated in (1)-(2), without incorrectly predicting that trivial sentences such as those in (3) are also marked. For example, we will show later that in a case like (1-a), the triviality can be traced solely to the configuration of logical terms—the interpretation and identity of the non-logical terms is irrelevant. In a case like (3-a), however, the contradiction is due also to the identity of the non-logical terms. If the deductive system cannot 'see' that the two tokens of *rain* are the same, it cannot determine that there is a contradiction in (3-a) and so doesn't mark that expression as unacceptable. Assuming the details can be worked out, postulating that the Grammar and its deductive system see only logical skeletons seems to account for the difference between acceptable and unacceptable trivial sentences, a considerable feat.[3]

Treating logical forms as logical skeletons has far reaching implications for our conception of language, natural logic, and their interface with general knowledge and reasoning. First, it entails a division between semantics and pragmatics according to which what is delivered by the compositional processes to pragmatics are not even characters, as standardly conceived (cf. Chomsky 2005, 2013). Secondly, logical skeletons are best paired with a view

2 Terminological note. In this paper, I follow the standard convention in linguistics of using the terms 'unacceptable' and '*' to mark expressions that are bad in a strong sense, i.e., indistinguishable or quite similar to the phenomenology of ungrammaticality. The flip side of this is that, in the sense used here, an expression can be strictly 'acceptable' and still be somewhat odd. There are of course many borderline cases, but in most of the cases explored in this paper the classifications are relatively uncontroversial.

3 I should clarify at the outset that none of the competing views for how to develop the logicality of language *identify* logical triviality with ungrammaticality. These views are compatible with the standard position that some non-trivial sentences are unacceptable for purely grammatical reasons. They are also compatible with the view that some expressions which ultimately have trivial truth conditions are acceptable. With respect to the latter point, however, there are some subtle differences between the views (see §3.3 below).

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of the Grammar as radically modular: i.e., as insulated not only from conceptual systems and general knowledge, but even from information that is standardly taken to be encoded in the lexicon. Thirdly, a deductive system which can only see logical skeletons—such that every predicate hence sentential token is treated as if independent—is one for which most classical formulas and rules of inference are not valid (cf. Williamson 1994). To be sure, proponents of the logicality of language such as Chierchia (2013) and Fox & Hackl (2007) explicitly embrace versions of the first two implications. At the same time, the full effect of the third implication is less appreciated, and arguably problematic for some accounts based on the logicality of language, as I argue in §5.2-5.3. At any rate, it is obviously worth exploring whether we can wed the logicality of language with different assumptions about logical form.

The main task of this paper is to show that we can maintain the logicality of language, as outlined in (i) and (ii) above, and account for the difference between L-trivial and acceptable trivial sentences, without assuming that the deductive system operates on logical skeletons. We adopt instead a standard view of logical forms, such that they represent when different tokens are of the same non-logical terms; but assume, following Sauerland (2014) and related proposals by Martí (2006); Pagin & Pelletier (2007); Recanati (2010); Stanley (2000); Szabó & Stanley (2000); Kamp & Partee (1995), among others, that at LF non-logical or open class terms—e.g., nouns and verbs—can be arguments to operators which modulate their meaning.[4]

(5) **Logical forms + Rescale**

a. The subset of the trivial sentences which are unacceptable is formally definable by the configuration of their functional terms at logical form. Call these 'L-trivial'.

b. Language and its deductive system see representations whose constituents, including non-logical terms, have been assigned their semantic values, and see when different tokens are of the same open class term.

c. Non-logical items can be arguments of an optional RESCALE operator. Different tokens of the same expression can differ with respect to whether/how each token is modified by RESCALE.

In §4 I show that we can adopt LF+RESCALE, as defined in (5), and still account for the target semantic restrictions on the distribution of quantifiers. That is, given standard logical forms and an optional RESCALE of open class terms, only L-trivial sentences can be proven to be trivial. In addition, superficially trivial sentences which are perceived as acceptable, such as those in (3), are correctly predicted to be acceptable. It follows that accounting for L-triviality is not a strong reason to accept logical skeletons over LF+RESCALE. Furthermore, I argue in §5 that in some key cases only LF+RESCALE makes the right predictions. If

4 For our purposes, the key characteristic of this family of views is that open class terms are represented in a way that allows for modulation. The implementation I present—using an optional higher-order covert operator—is most directly inspired by Sauerland (2014). For reasons that will emerge, I think this implementation has key advantages. Still, I expect that other implementations could, with some refinements, be adopted. For example, we could use a constrained version of the system defended in Pagin & Pelletier (2007) and Recanati (2010), where the interpretation function is defined in terms of a function of modulated interpretation. We could also pursue a version of Stanley (2000, 2007), and assume that open class terms are restricted via intersective combinations with covert syntactic elements. In all these cases, the hypothesized operations that perform modulation can be heavily constrained—which is required to avoid over-generation of meanings—without affecting any of the points I make here. These options are compared in more detail in §3.

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this is correct, we can maintain the logicality of language without assuming its radical modularity, and in particular that language does not see information encoded in the lexicon that is unique to particular open class terms. We can also maintain, or at least explore the hypothesis, that the natural deductive system of language follows classical inference rules.

2 Restrictions on quantificational determiners

The acceptability patterns which are the main focus of this paper concern three well-known restrictions on the distribution of quantifiers. The aim of this section is to see (i) that the key generalizations can best (and arguably only) be captured semantically, and (ii) that in each case we can systematically show that the unacceptable cases have trivial truth-conditions. Our presentation follows closely that of Gajewski (2009).[5]

2.1 Definiteness effect in there*-existential sentences*

The first case we explore involves a definiteness effect in *there*-existential sentences, which we already encountered above in (2-a). The basic contrast is captured by examples such as (6-a)-(6-b) below. As noted in the generalization in (7), quantifiers such as *many* and *few* are acceptable in *there*-existentials, whereas quantifiers such as *all* and *most* are unacceptable.

(6) a. There are *some* curious students
b. *There is *every* curious student.

(7) Generalization:
a. Acceptable: *some, three, a, many, few, exactly two, no*
b. Unacceptable: *every, all, neither, both, the, most*

Crucially, the target generalization in (7) can be captured in semantic terms. Specifically, the determiners that can occur in *there*-existentials are the *weak* determiners (Barwise & Cooper 1981), defined as in (8):

(8) a. Determiner D is *positive strong* iff for every model $M =< [\![\ ]\!], D_e >$ and every $A \subseteq D_e$, if $[\![D]\!](A)$ is defined,
then $[\![D]\!](A)(A) = 1$
b. D is *negative strong* iff for every model $M =< [\![\ ]\!], D_e >$ and every $A \subseteq D_e$, if $[\![D]\!](A)$ is defined,
then $[\![D]\!](A)(A) = 0$
c. D is *weak* if D is not *strong*.

A paradigmatic example of a positive strong determiner is *every*, as illustrated by the observation that (9-a) is always true, regardless of what interpretation we assign to $[\![student]\!]$. A

5 There are other acceptability patterns which have been explained as arising from trivial truth-conditions, some of which we will discuss in §5.2-§5.3. These include constrains on adverbial modification (Dowty 1979), polarity items (Chierchia 2006, 2013), negative islands and modified numerals (Fox & Hackl 2007), and weak islands (Abrusán 2011a, 2014). We focus primarily on the cases involving quantifiers in *there*-existentials, connected exceptives and comparatives for two reasons. First, they have played a central role in the argument for logical skeletons; secondly, the corresponding generalizations and accounts are less controversial than other generalizations and accounts which appeal to trivial truth-conditions. Of course, whether the logicality of language should be paired with logical skeletons or LFs+Rescale will remain an interesting open issue as long as new cases of unacceptability due to triviality (or counter-examples thereof) continue to be discovered.

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paradigmatic example of a weak determiner is *some*, as illustrated in (10-a), which is false in a world where there are no students, and true in a world in which there is at least one student.

(9) $[\![every]\!](A)(B) = 1$ iff $A \subseteq B$ [strong]
   a. Every student is a student.

(10) $[\![some]\!](A)(B) = 1$ iff $A \cap B \neq \emptyset$ [weak]
   a. Some student is a student.

It is easy to see why the semantic property which captures the acceptability patterns of quantifiers in *there*-existentials—namely, that positive/negative strong quantifiers result in unacceptability—gives rise to trivial truth conditions:

(i) Assume, as is independently plausible, that $[\![there\ is/are]\!]$ simply denotes D_e, i.e., the set of entities in the model.

(ii) Given Conservativity,[6] if D is (positive) strong, then for all $A \subseteq D_e$, $[\![D]\!](A)(D_e) = [\![D]\!](A)(D_e \cap A) = [\![D]\!](A)(A) = 1$.[7]

From (i) and (ii) it follows that (6-b), given the logical form in (11-a) (where S = the set of curious students), is trivially true, whereas (6-a), given the logical form in (11-b), is true or false depending on whether there are any curious students.

(11) a. $[\![every]\!](S)(S \cap D_e) = 1$ iff $S \subseteq S$
   b. $[\![some]\!](S)(S \cap D_e) = 1$ iff $S \cap S \neq \emptyset$

If we assume that trivial sentences are filtered out by the deductive system, we can explain why only weak determiners can occur in *there*-existential sentences.

2.2 Selection properties of Connected Exceptive Phrases

The second case we consider involves the selection properties of connected exceptive phrases. The basic pattern is illustrated by the contrast in (12-a)-(12-b). As specified in (13), the target generalization is quite simple: only determiners such as *every, all, none* can host connected exceptives.

(12) a. *Some student but Sue passed the exam.
   b. Every student but Sue passed the exam.

(13) Generalization:
   a. Acceptable: *every, all, none*
   b. Unacceptable: the rest

Note that the class of determiners that can host connected exceptives is semantically definable: they are the universal (negative/positive) quantifiers. As before, this suggests that the semantic property which captures the target generalization will play a key role in its explanation.

6 Conservativity: For all M and all $A, B \subseteq M$, $[\![D]\!](A)(B)$ iff $[\![D]\!](A)(A \cap B)$.

7 We focus on the case of positive strong quantifiers for simplicity. If D is *negative strong* (e.g., *neither*), then we should change the right hand side of the equation to 0, and instead of a trivially true we get a trivially false sentence (i.e., false in all words/situations).

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The basic account, due to von Fintel (1993), is based on two observations:

(i) The complement of *but* is the least that you have to take out of the restrictor of the host quantifier to make the statement true.

(ii) Universal determiners—e.g. *every* and *no*—are the only determiners that systematically allow such minimal exceptions. Other quantifiers yield logical trivialities.

Let us see how this works. Initially, one could be tempted to assign *but* the entry in (14-a). The problem, however, is that then (12-b), for example, would not entail that Sue did *not* pass the exam. To avoid this problem, von Fintel argues that we need an entry closer to (14-b):[8]

(14) Every$_D$ [student$_A$ but Mary$_C$] smokes$_P$

a. $[\![but]\!](C)(A) = A - C$

b. $[\![but]\!](C)(A)(D)(P) = 1$ iff
$C \neq \emptyset$ and $D(A - C)(P) = 1$ and $\underbrace{\forall S[D(A - S)(P) = 1 \rightarrow C \subseteq S]}_{\text{captures 'the } \textit{least} \text{ you have to take out'}}$

Consider the interaction between *but* and different kinds of quantifiers. Focusing on examples such as (12-a), we can show that any left upward entailing quantifier (e.g., *some, many, three*), when hosting a connected exceptive phrase, will result in a trivially false statement:[9]

(15) D is a *left upward entailing quantifier* iff $\forall A, B, C$ s.t.
$[\![D]\!](A)(C) = 1$ & $A \subseteq B$, $[\![D]\!](B)(C) = 1$

Why? If D is left upward entailing and you have removed some individuals from D's restrictor and the statement is true, then you could always have removed fewer and still be left with a true statement. To see this: suppose $A = B - s$, then $A \subseteq B$. In other words, the set A denoted by 'B but s' $\subseteq B$. Given a left upward entailing quantifier, you can thus replace A with B (its superset) in its restrictor. It follows that s is not the least you have to take out to make statement true, since you can simply take out nothing.

2.3 Negative islands in comparatives

The third and final acceptability pattern concerns negative islands in comparatives (Gajewski 2008b). The basic observation, illustrated in (16-a)-(16-b), concerns constraints on the kinds of quantifiers that can appear inside a comparative clause.

(16) a. *Mary is taller than no other student is.
b. Mary is taller than every other student is.

(17) Generalization
a. Acceptable: the rest.
b. Unacceptable: *no, few, fewer than 4, at most 7, not every*

8 To see the difference between the two entries for *but*, consider a world w were every student, including Mary, smokes. According to (14-a), *Every student but Mary smokes* would be true in w, which is an incorrect prediction. In contrast, (14-b) correctly predicts that the statement is false in w.

9 Note that universal positive/negative quantifiers are left downward entailing. So what we have to show is why the other left monotonic quantifiers, specifically, the left upward entailing, cannot host connected exceptives. For simplicity, we ignore for now the left non-monotonic quantifiers such as *exactly 3*, which also cannot host connected excepitives, as is illustrated by **Exactly three students but/except Mary smoked*.

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The target generalization can again be captured in semantic terms. The problematic quantifiers are the downward entailing (generalized) quantifiers. As before, this suggests that this semantic property is essentially involved in the explanation of the basic acceptability pattern.

Moving to the explanation, we begin by specifying the truth-conditions of comparative statements such as (16-a) and (16-b). Following Gajewski (2008b)'s account, the truth-conditions of the target comparatives are as in (18).[10] We assume, in addition, that gradable adjectives, represented by P in (18), are monotonic, as defined in (19):

(18) *A is P-er than Q is* $= 1$ iff
∃d [A is d-P and Q is *not* d-P]

(19) A gradable adjective P is monotonic iff $P(d)(x) = 1$ and $d' < d$, then $P(d')(x) = 1$

Given these assumptions, if Q in (18) is downward entailing, we get tautologies.

(20) A (generalized) quantifier Q is *downward entailing* iff for all A, B s.t. $A \subseteq B$ and $[\![Q]\!](B) = 1$, then $[\![Q]\!](A) = 1$

To see why, consider two worlds, w_1 and w_2, and a domain which consists of the students Mary, Susan, and Bill. In w_1, Mary = 1.6m, Susan = 1.5m, Bill = 1.4m. In w_2, Bill = 1.6m, Mary = 1.5m, and Susan = 1.4m. We can easily see that (21) makes a contingent statement, whereas (22), where Q is replaced with a downward entailing generalized quantifier, is trivially true.

(21) Mary is taller than every other student is.
  a. ∃d [Mary is d-tall and every other student is *not* d-tall]
  = 1 @ w_1, for let d = 1.6m, then Mary is d-tall but no one else is d-tall.
  = 0 @ w_2 since any d ∈ Mary's height (0, 1.5] is in Bill's height (0, 1.6]

(22) *Mary is taller than no other student is.
  a. ∃d [Mary is d-tall and no other student is not d-tall]
  = ∃d [Mary is d-tall and every student is d-tall]
  = 1 in w_1/w_2 since d can be between (0, shortest student's height]

As before, if we assume that the deductive system marks as ungrammatical trivial statements (true/false in all worlds or situations), we can explain the basic acceptability pattern concerning negative islands in comparatives.

3 The Glitch: Acceptable trivialities, logical skeletons and enriched logical forms

We have seen that if we assume the logicality of language—i.e., that the Grammar works with a deductive system which can determine whether, and filter out when, sentences are trivial—we can account for various systematic restrictions on the distribution of quantifiers. However, as mentioned in §1, this otherwise powerful account has a glitch: tautologies and

10 The precise logical form and truth conditions of comparatives is an area of lively debate. For overviews see Schwarzchild & Wilkinson (2002); Schwarzschild (2008); Morzycki (2016). Gajewski (2008b) argues that a key point in favor of his theory—called the 'existential' theory for reasons that will become clear below—is precisely that it can account for the acceptability pattern captured in (17). Morzycki (2016: ch.4), however, argues that other standard theories, in particular the 'maximality theory', can also capture the target pattern (via undefinedness of the maximality operator in the unacceptable cases).

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contradictions are not, in general, marked as unacceptable. Examples such as those in (23), which superficially seem like the most obvious cases of trivial sentences, are perfectly grammatical, even if in some contexts they feel somewhat odd:

(23) a. It is raining and it isn't raining
b. If Fred is wrong, then he is wrong.
c. Every square is a square.
d. My brother is an only child

How can we maintain the logicality of language accounts for the semantic restrictions on the distribution of quantifiers examined in §2, without incorrectly predicting that superficially trivial expression such as those in (23) are ungrammatical? This section presents and develops two competing solutions to this problem, Logical skeletons and LF+Rescale.

3.1 Logical skeletons

As noted in §1, Gajewski (2002, 2009) argues that we solve the glitch by adopting Logical skeletons (see also Chierchia 2006, 2013; Fox & Hackl 2007). The basic idea, captured in (4) above, is that there is a formally specifiable subset of the trivial sentences, called 'L-trivial', whose members are unacceptable. Gajewski argues that unacceptable trivial expressions such as those discussed in §2 are L-trivial, whereas acceptable trivial expressions such as those in (23) are not L-trivial. This proposal rests on two assumptions about the architecture of language:

A1. Terms can be sorted into two classes, roughly corresponding to the traditional dichotomies of logical vs. non-logical terms, functional vs. non-functional terms, or closed-class vs. open-class words.

A2. The deductive system does not 'see' the non-logical terms. Specifically, their semantic type is represented, so that compositionality can proceed, but the language system does *not* encode different tokens of the same non-logical terms as the same.

The suggestion, then, is that the language system sees only 'logical skeletons'.

(24) **Logical skeleton**
To obtain the logical skeleton of a standard logical form α:
a. Identify the maximal constituents of α containing no logical terms.
b. Replace each such constituent with a new constant of the same semantic type.

We can now formulate precisely which trivial sentences are unacceptable:

(25) (i) A sentence S is L-trivial iff S's logical skeleton = 1 (or 0) in *all* its interpretations (in which S is defined).
(ii) S is ungrammatical if its logical form contains an L-trivial sentence.

In what follows, we assume A1 (for discussion, see van Benthem 1989, 2002; Gajewski 2002, 2009; Chierchia 2013; Abrusán 2014). In most of the cases we consider, the target terms clearly fall on either the logical/closed-class or non-logical/open-class side of this dichotomy.[11] In addition, we will see in §4 that, as Gajewski has shown, the triviality of

11 This claim should be qualified. As a reviewer pointed out, there is currently no fool-proof method for distinguishing between functional/logical and content/open-class terms. Indeed, this is explicitly acknowledged

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our target cases concerning the distribution of quantifiers can indeed be proven from their logical skeletons.

What is crucial, at this point, is to see why acceptable trivial sentences such as those in (23) cannot be proven as trivial from their logical skeletons, which is the desired result. If we apply the procedure in (24) to (23-a), repeated in (26-a), we get as its logical skeleton (26-b). Note that (26-b) is indistinguishable from the logical skeleton of a structurally equivalent yet informative contingent statement such as (27-a). This can be seen by comparing (26-b) and (27-b). It follows that the deductive system cannot determine (even if we enrich it with heuristics) that superficial contradictions such as (26-a), which it sees as (26-b), are trivial. As a result, such expressions are not filtered out.

(26) a. It is raining and it isn't raining.
b. It is $P_{1,<e,t>}$-ing and it isn't $P_{2,<e,t>}$-ing

(27) a. It is raining and it isn't snowing.
b. It is $P_{1,<e,t>}$-ing and it isn't $P_{2,<e,t>}$-ing

The same argument can be easily extended to show that the other superficially trivial examples in (23) are not L-trivial. As mentioned above, we will see in §4 that the target acceptability patterns concerning the distribution of quantifiers examined in §2 can be predicted from logical skeletons. Taken together, these results suggest that endorsing Logical skeletons is the key to maintain the logicality of language, i.e., the hypothesis that the Grammar has an automatic deductive system which can identify and filter out trivial sentences. Indeed, most proponents of the logicality of language accept this approach. From now on, I shall refer to this view using the shorter 'Skeletons'.

3.2 Logical forms + Rescale

The main contention of this paper is that there is a better way to maintain the logicality of language in light of the acceptability of (superficially) trivial examples such as those in (23). As a starting point, note that there are various independently motivated views about logical form which entail that (most) cases in (23) are not trivial (e.g., Sauerland 2014; Alxatib et al. 2013; Recanati 2010; Stanley 2007; Kamp & Partee 1995). These views share the idea that the meaning of open-class terms can often/always be modulated, either because of the presence of covert (optional) operators (cf. Sauerland 2014; Martí 2006; Jacobson 2005; Stanley 2007), or because the interpretation function is defined in such a way that it modulates the meaning of those expressions as a function of their fine-grained utterance context (cf. Kamp & Partee 1995; Pagin & Pelletier 2007; Recanati 2010; Lasersohn 2012).[12]

by most proponents of the logicality of language (see, e.g., Gajewski 2009; Abrusán 2014). One proposal for picking out the logical terms is by appealing to the property of permutation invariance (e.g., van Benthem 1989). However, as Gajewski (2009) and Abrusán (2014) show, this leaves out some terms whose identity is crucial to prove some L-trivialities, and arguably allows some terms that are intuitively open-class. von Fintel (1995) presents a more promising proposal which singles out the functional terms by appealing to a cluster of properties including permutation invariance, having high-types, and being subject to universal constraints. In any case, readers skeptical of efforts to defend A1 shouldn't be too bothered about this, for in the end I advocate a position that does not appeal to the notion of logical skeletons.

12 Abrusán (2014: ch. 6) makes a similar observation in her discussion of logical skeletons and the logicality of language. Her overall position is broadly congenial to the position developed here, and most of the objections she raises against logical skeletons complement the arguments presented in §5. Still, I should mention a key difference between the positive proposal made by Abrusán (2014) and my proposal. To successfully pair views which allow modulation with the logicality of language, it is, in my view, crucial that the mechanism which modulates open class terms be implemented as part of the compositional semantics

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The specific proposal I defend—which is most directly inspired by Sauerland (2014)—was introduced in (5) as LF+Rescale. On this view, we assume that the Grammar and its deductive system see standard logical forms, in particular whether different tokens are of the same open class term. To capture the idea that the interpretation of open class terms can be modulated as a function of context, we assume that logical forms include an optional polymorphic type Rescale operator which can take non-logical terms and fine tune (e.g, intersect) their meaning in certain constrained ways.

(28) **Logical Form + Rescale**
To obtain an LF+Rescale
a. Identify the maximal projections of open class heads (adjectives, nouns, adverbs, verbs).
b. You may optionally add Rescale as an adjunct.

Overt operators similar to Rescale are terms such as *typical* and *good*. Like those modifiers, Rescale is technically a character, hence its precise effect depends on the context of utterance. At the most general level, we assume that, for any open class term P, argument of suitable type x and context c, $\{x : \text{Rescale}_c(P)(x)\} \subseteq \{x : P(x)\}$. That is, the meaning modulation is constrained to specialize meanings, where the precise refinement depends on the context parameter c. Like its overt counterparts, Rescale can appear at various positions in an expression, and its context sensitive parameter can be fixed differently at each position. To model this, we assume that each token of Rescale is interpreted in its dynamically updated local context.[13]

LF+Rescale can be refined and developed in various ways. Still, we can already begin to see how it can account for acceptable trivial sentences. On this view, acceptable trivial sentences such as (29) and (30) can be assigned the LFs in (29-a) and (30-a), which are non-trivial and potentially informative expressions. To be clear, (29) and (30) can also have LFs without Rescale, as in (29-b) and (30-b); but since these are formally trivial, they are marked as unacceptable and are dispreferred relative to the alternative disambiguations which are acceptable and potentially informative.

(29) It is raining and it isn't raining.
a. It is raining and it isn't Rescale_c(raining).
≈ It is raining and it isn't raining hard.
b. *It is raining and it isn't raining.

(30) If Fred is wrong, then he is wrong.
a. If Fred is Rescale_c(wrong), then he is $\text{Rescale}_{c'}$(wrong).
≈ If Fred is slightly wrong, then he is totally wrong.
b. *If Fred is wrong, then he is wrong.

The basic idea can be generalized: when Rescale is inserted the resulting logical forms can 'rescue' acceptable tautologies/contradictions such as those in (23). As a result, LF+Rescale

rather than as a post-compositional, pragmatic processes. The basic argument for this will be presented in §3.3 and further developed in §5 (cf. Alxatib et al. 2013). Abrusán (2014), however, follows Kamp & Partee (1995) in treating the relevant modulations as pragmatic processes. In contrast, the account I defend is closer to the syntactic/semantic accounts defended by Sauerland (2014) and Stanley (2007).

13 The notion of a 'local context' is here used broadly, and is in principle compatible with different implementations. Since this paper uses a standard static semantics, it is easier to opt for implementations designed for static systems, such as Schlenker (2009) and Stalnaker (2014). But we could also opt for more dynamic implementations, such as Heim (1983, 1982), Barker (2002) and Rothschild (2011).

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can also explain why superficially trivial sentences such as those in (23) have acceptable readings.[14]

3.3 Rescale is independently needed: Embedded trivialities

Skeletons and LF+RESCALE both have the resources to explain why, even if we assume the logicality of language, superficial trivial statements such as those in (23) can be acceptable. However, I now want to suggest that something like RESCALE of open class terms is independently needed to account for certain simple variations of acceptable trivial sentences.

A crucial difference between Skeletons and LFs+RESCALE is that only the latter has the resources to fully explain the default intuitive readings of acceptable superficial trivialities. To see why, recall that, according to Skeletons, an acceptable contradiction such as (31), is seen by the deductive system as (31-a), which is the reason why it is not ruled out.

(31) It is raining and not raining.
  a. It is P_1 and not P_2.
  b. It is P and not P.

At a later post-compositional stage of processing, namely, when (31-a) is sent to pragmatics for the assignment of full truth-conditions (and further inferential processes), something like the information represented in (31-b) is recovered, namely, that $P_1 = P_2$. At this point, the contradiction can be identified. What happens at this stage? As far as I know, neither Gajewski nor others who endorse Skeletons directly address this question. Still, this account is compatible with familiar pragmatic stories. Namely, when (31) is recovered at the (post-compositional) pragmatic stage, we can use Gricean reasoning to derive, from its assertion, an informative implicature, such as that it is raining but not that hard.

The problem for this kind of pragmatic account is that there are cases of embedded uses of acceptable contradictions in non-asserted positions, as illustrated in (32)-(34). As is well known, such enriched embedded readings challenge post-compositional pragmatic stories which work on asserted contents as inputs (Chierchia et al. 2012; Recanati 2003, 2010).

(32) If it is raining and not raining, I am willing to go out and play.
  a. If it is raining and not RESCALE_c(raining), I am willing to go out and play.
  ≈ If its raining but not that hard, I am willing to go out and play

(33) If John is tall and not tall, I bet he won't make it into the basketball team
  a. If John is tall and not RESCALE_c(tall), I bet he won't make it into the basketball team

14 Some clarifications are in order. First, we will see later that we can adopt less constrained accounts of the expressive power of RESCALE without affecting any of the points made in this paper. Put in terms familiar from discussions of contextualism, although we assume that the effect of RESCALE is intuitively that of 'enriching' meanings, everything we say here is compatible with assuming that it can also 'loosen' meanings (cf. Recanati 2010). In this case, we say that for any open class term P, argument of suitable type x and context c, either $\{x : \text{RESCALE}_c(P)(x)\} \subseteq \{x : P(x)\}$ or $\{x : P(x)\} \subseteq \{x : \text{RESCALE}_c(P)(x)\}$. Secondly, like *typical*, RESCALE is defined relative to a contextual parameter, and is only felicitous if the context provides the required information. This predicts that some rescued superficial contradictions, uttered out of context, can feel somewhat zeugmatic, analogous to an out of context utterance of *that is not like that*. Finally, if we assume that functional terms have higher-order types, then the type of non-functional terms, which are the only arguments of RESCALE, can be defined as $< a, b >$, were a is a basic type excluding the truth-values. The type of RESCALE would then be $<< a, b >, < a, b >>$. This entails that RESCALE can apply recursively, which is desirable given its status as a modifier similar to *typical*, and is in any case required to deal with examples like *a typical gun is not a typical gun* and *it is raining hard and not raining hard*.

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≈ If John is borderline tall, I bet he won't make it into the basketball team

(34) Peter is either smart but not smart, or he has no experience running a tough business.

a. Peter is either RESCALE$_c$(smart) but not RESCALE$_{c'}$(smart), or he has no experience running a tough business.
≈ John is either book smart but not street smart, or he has no experience running a tough business.

Although out of the blue cases like (32)-(34) can feel a bit odd, it is clear that they are strictly acceptable, and it is easy to imagine contexts in which they get the suggested readings. Furthermore, embedded enrichments in non-asserted clauses call for a treatment within the compositional semantics. Accordingly, (32)-(34) point to the availability of a semantic rescue mechanism along the lines of RESCALE: i.e., a way of generating, within the compositional semantics, formally non-contradictory/non-tautologous logical forms for superficially trivial sentences in embedded positions, as illustrated in (32-a), (33-a) and (34-a).

As so far presented, LF+RESCALE seems to entail that, when using natural languages, we can't really assert trivialities: for it works as if the language system always generates logical forms which make superficially trivial statements of the kind in (23) potentially informative. However, there are cases in which we use such trivial statements to convey precisely the trivial readings. This is illustrated by a salient reading of the antecedent in (35) below. To see why LF+RESCALE is not in tension with examples like this, recall that RESCALE, just like similar overt modifiers such as *typical*, is technically a character. Its full modulatory effect is determined only once certain contextual parameters are provided.

(35) If John believes that it is raining and not raining, then he has inconsistent beliefs.

a. *If John believes that it is raining and not raining, ...
b. If John believes that it is raining and not RESCALE$_c$(raining), ...
c. If John believes that it is RESCALE$_c$(raining) and not RESCALE$_{c'}$(raining), ...

To be clear, this account *does* predict a default preference for logical forms such as (35-b)/(35-c) over (35-a). Crucially, however, this technically allows that, for some c, c', RESCALE$_c(P) = P$, or that RESCALE$_c(P)$ = RESCALE$_{c'}(P)$ (see the definition of RESCALE in §3.2). Hence this account allows for the eventual assignment of trivial readings to embedded statements such as *it is raining and not raining*. Still, since the decision to fix the context sensitive parameter of RESCALE is a post-semantic, pragmatic process, these trivial readings are not seen as such by the deductive system, hence are not filtered out.[15]

To sum up, we have seen that although Skeletons and LF+RESCALE can both account for the acceptability of superficially trivial statements such as those in (23), cases of embedded superficial trivial statements such as (32)-(34) provide independent motivation for something like RESCALE. Obviously, this is not yet to suggest that we should abandon

15 One could argue that this account also predicts that there should be a strong default tendency to interpret superficial tautologies and contradictions non-trivially. Although there are ways of blocking or hedging this prediction for proponents of LF+RESCALE, it is perhaps best for now to simply accept it. For there is empirical work which suggests that ordinary speakers tend to interpret superficial tautologies and contradictions informatively (in contrast to, say, trained philosophers, logicians and formal semanticists). For relevant empirical and theoretical work, see Osherson & Markman (1975); Wierzbicka (1987); Ward & Hirschberg (1991); Sauerland (2011); Cobreros et al. (2012); Alxatib et al. (2013); Snider (2015)

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Skeletons for LF+Rescale. For what Gajewski (2002, 2009) has crucially shown is that by adopting Skeletons we can rescue *just* the acceptable trivial sentences. Only if the same result can be achieved by adopting LF+Rescale can we say that we have really undermined, by a kind of Occam's razor argument, the need to posit logical skeletons. Establishing that result is the aim of §4. I will then argue, in §5, that there are various cases in which LF+Rescale makes different and better predications than Skeletons.

4 Back to restrictions on quantificational determiners: Logical skeletons and LF+Rescale

Gajewski (2002, 2009) argues that the triviality patterns involving *there*-existentials, connected exceptives and negative islands in comparatives presented in §2 can be proven from their logical skeletons. Our main task now is to show that the target trivialities can also be proven from their standard LFs+Rescale. If correct, this means that, despite common assumptions to the contrary (see e.g., Chierchia 2006, 2013; Fox & Hackl 2007; Gajewski 2009), the account of L-triviality used to separate acceptable from unacceptable trivial sentences does not depend on pairing the logicality of language with Skeletons. Accounts that use standard logical forms but also allow constrained modulation of open class terms via something like Rescale work just as well.

4.1 There *existential sentences*

Consider first the acceptability patterns involving *there*-existentials, focusing again on examples (6-a) and (6-b), repeated here as (36) and (37). It is easy to see that the original explanation, as spelled out in §2.1, goes through given their logical skeletons, specified in (36-a) and (37-a). Since *some* is weak, (36-b) may get 1 or 0 depending on whether the semantic value assigned to P_1—i.e., $I(P_1)$—is ultimately empty. On the other hand, since *every* is strong, (37-b) will always be true regardless of the interpretation assigned to P_1, since for any assignment, $I(P_1) \subseteq (I(P_1) \cap D_e) \subseteq D_e$ (note: P_1 is of type $< e, t >$). It follows that only (37) is L-trivial, and predicted to be marked as unacceptable.

(36) There are some curious students.
   a. Logical skeleton: [*there* [*are* [*some* $P_{1,<e,t>}$]]
   b. Interpretation: $[\![some]\!](I(P_1))(D_e)$
      $= 1$ iff $I(P_1) \cap D_e \neq \emptyset$

(37) *There is every curious student.
   a. Logical skeleton: [*there* [*is* [*every* $P_{1,<e,t>}$]]
   b. Interpretation: $[\![every]\!](I(P_1))(D_e)$
      $= 1$ iff $I(P_1) \subseteq D_e$

Note that essentially the same story holds even if the deductive system can see LFs+Rescale. We have already shown this in §2.1 for standard LFs, so what we have to see now is just that modifying the open class terms by Rescale does not change the acceptability patterns:

- In (36), even if the deductive system can see that $P_1 = [\![curious\ students]\!]$, information about the evaluation world is required to determine whether anything falls under it. Introducing Rescale($[\![curious\ students]\!]$) (e.g., to mean something like

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'there are some extremely curious students') doesn't change that fact.[16]

- In (37), even if we introduce RESCALE($[\![$*curious students*$]\!]$) to its LF, including recursive applications, the expression will still be tautologous, since it will always hold that:
  RESCALE(RESCALE($[\![$*curious students*$]\!]$)) $\subseteq$
  RESCALE($[\![$*curious students*$]\!]$) $\subseteq D_e$

As with logical skeletons, then, only (37) comes out as L-trivial. The reason why the target explanation holds with LFs+RESCALE if it holds with logical skeletons is obvious. Suppose sentence S comes out as L-trivial on the basis of its logical skeleton. This means that the particular semantic values of its open class terms do not make a difference to S's truth value. A fortiori, it does not make a difference whether its open class terms are (recursively) modified by RESCALE.

4.2 Connected exceptive phrases

Consider next the acceptability patterns on quantifiers imposed by connected exceptives, illustrated by (12-a) and (12-b), repeated here as (38) and (39). Some interpretations of $P_1 \ldots P_3$ will make (38) true, and others will make it false. However, all interpretations (which do not result in presupposition failure, hence where $I(P_2)$ is not empty) will map (39) to false. Since *some* is left upward entailing, we can always subtract less than $I(P_2)$, whatever that is, namely, we can subtract nothing (let $S = \emptyset$).

(38) Every student but Mary smokes
  a. Logical skeleton: [*every* [P_1 *but* P_2] P_3]
  b. Interpretation:
  $[\![but]\!](I(P_1))(I(P_2))[\![every]\!](I(P_3)) = 1$ iff $I(P_2) \neq \emptyset$ and
  $[\![every]\!](I(P_1) - I(P_2))(I(P_3)) = 1$ and
  $\forall S[[\![every]\!](I(P_1) - S)(I(P_3)) = 1 \rightarrow I(P_2) \subseteq S]$

(39) *Some student but Mary smokes.
  a. Logical skeleton: [*some* [P_1 *but* P_2] P_3]
  b. Interpretation:
  $[\![but]\!](I(P_1))(I(P_2))[\![some]\!](I(P_3)) = 1$ iff $I(P_2) \neq \emptyset$ and
  $[\![some]\!](I(P_1) - I(P_2))(I(P_3)) = 1$ and
  $\forall S[[\![some]\!](I(P_1) - S)(I(P_3)) = 1 \rightarrow I(P_2) \subseteq S]$

As in the case of *there*-existentials, what is important to note is that essentially the same story holds if we assume instead LFs+RESCALE. In §2.2, we have already shown how we capture the acceptability patterns for standard LFs; so what we now have to show is that introducing RESCALE does not lead to incorrectly rescuing (39). The only position where the modification could be problematic is RESCALE($I(P_2)$), since this could potentially narrow the extension of the complement of *but*. In other words, we know that RESCALE($I(P_2)$)$\subseteq$ $I(P_2)$; however, to avoid presupposition failure, RESCALE($I(P_2)$) $\neq \emptyset$. At this point, its

16 Although here I briefly consider a case in which RESCALE potentially downgrades an LF, it is in general unnecessary to check this option. For suppose that adding RESCALE to an otherwise acceptable LF would result in unacceptability. The original LF without RESCALE would then be selected as the preferred disambiguation. In subsequent sections I discuss only cases in which adding RESCALE could potentially rescue an otherwise unacceptable LF.

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easy to see that, since *some* is left-upward entailing, we can still choose $S = \emptyset$, hence (39) will (when defined) always be false.[17] The following intuitive examples illustrate the basic point. The problem with (40-a) is that we could always substract less and keep truth, as in (40-b). But the same holds if we try to rescue (40-a) by adding a RESCALE as in (41-a): although this can take us to a subset of the complement of *but*, it still holds that we can substract less, namely nothing, and keep truth, as in (41-b)

(40) a. *Some [students but the smart ones] smoke.
b. Some [students $-$ $\emptyset$] smoke.

(41) a. *Some [students but the RESCALE(smart) ones] smoke.
$\approx$ *Some [students but the very smart ones] smoke.
b. Some [students $-$ $\emptyset$] smoke

4.3 Negative islands in comparatives

Consider finally the restrictions on quantifiers in comparatives, illustrated by (42) and (43). Their logical skeletons and corresponding interpretations are given in (42-a)-(42-b) and (43-a)-(43-b) respectively.

(42) Mary is taller than every student is ~~tall~~.
a. Logical skeleton:
[A is $P_{1,<d,<e,t>>}$-er [than [every $P_{2,<e,t>}$] is $P_{3,<d,<e,t>>}$]]
b. Interpretation:
$\exists$d [I(A) is d-I(P_1) and every I(P_2) is not d-I(P_3)]

(43) *Mary is taller than no student is ~~tall~~.
a. Logical skeleton:
[A is $P_{1,<d,<e,t>>}$-er [than [no $P_{2,<e,t>}$] is $P_{3,<d,<e,t>>}$]]
b. Interpretation:
$\exists$d [I(A) is d-I(P_1) and no I(P_2) is not d-I(P_3)]

Note that, by the definition of logical skeletons, the tokens of *tall* are treated as if they could be different predicates (since gradable adjectives such as *tall* are open class terms). Despite this, Gajewski argues that L-triviality can still be proven for (43) if we place the following independently plausible constraints on $D_{<d,<e,t>>}$, the class of gradable predicates:

(44) a. Gradable adjectives are monotonic, as defined in (19) above.
b. The domains of gradable adjectives are restricted to scales, as illustrated in (45) for *tall* and *old*.

(45) a. $[\![tall]\!] =$
$\lambda d \in S_{\text{height}}.\ \lambda x : \exists d \in S_{\text{height}}[\text{height}(x) = d].\ d \leq \text{height}(x)$
b. $[\![old]\!] =$
$\lambda d \in S_{\text{age}}.\ \lambda x : \exists d \in S_{\text{age}}[\text{age}(x) = d].\ d \leq \text{age}(x)$

Given these assumptions, if $I(P_1)$ and $I(P_3)$ do not match, as in *tall* and *old*, then both (42-b) and (43-b) come out as undefined. If $I(P_1)$ and $I(P_3)$ match, then (42-b) is contingent. For as we saw in §2.3, for any gradable adjective $I(P_1)$, there are some worlds in which $I(A)$

17 Note that, if we let RESCALE 'widen' interpretations (as some modulation-friendly theorists would certainly insist we should), then, a fortiori, it cannot rescue (39). Indeed, none of the points I make here depend on defining RESCALE as a narrowing operation.

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is the $I(P_1)$-est, compared to all $I(P_2)$s, and some in which $I(A)$ is not the $I(P_1)$-est. In contrast, (43-b) comes out as trivially true when $I(P_1)$ and $I(P_3)$ match. To see this, recall the basic argument from §2.3. We need to find a degree d such that $I(A)$ (e.g., Mary) has d, and in addition each entity in the comparison class $I(P_2)$ has d. Given monotonicity, we can choose a d between (0, $d_{smallest}$], where '$d_{smallest}$' is the degree assigned to the smallest member of the union of $I(A)$ and the comparison class $I(P_2)$. Since there is always such a degree, (43) is, when defined, always true, and is therefore marked as unacceptable.

Accounting for the difference between expressions such as (42) and (43) given LF+Rescale instead of logical skeletons is quite simple. We have already shown, in §2.3, that we can generate the basic pattern of restrictions on negative generalized quantifiers in comparatives from standard logical forms. So what we have show now is that we cannot use Rescale to turn, say, (43), repeated below as (46), into a contingent statement. This is easy to see. We can use Rescale to restrict the interpretation of *student*, and get a contextual reading like (46-a). We can also use it to restrict either or both tokens of *tall*, and get a contextual reading like (46-b). Modulate any way you want, there will always be a degree d between (0, d_s], were d_s is the height of the smallest member of the union of Mary and the (restricted) set of students. In short, (46) is trivially true, even if we sprinkle Rescale wherever it's allowed, and is therefore marked as unnacceptable by the deductive system.

(46) *Mary is taller than no student is ~~tall~~.
  a. ∃d [Mary is d-tall and no smart student is not d-tall]
  b. ∃d [Mary is roughly d-tall and no student is not roughly d-tall]

5 Logical skeletons vs LFs+Rescale

Where do we stand? We have seen that, as Gajewski (2002, 2009) and others (e.g., Chierchia 2013; Fox & Hackl 2007) have argued, if we assume that the deductive system operates on logical skeletons, we can generate just the right class of L-trivial statements, i.e., the subset of the trivial sentences which are unacceptable. Specifically, if the representations that feed into the compositional semantics are logical skeletons, we cannot prove triviality for acceptable tautologies and contradictions such as those in (23), yet can still prove triviality for the unacceptable patterns involving quantifiers in *there*-existentials, connected exceptives and negative islands in comparatives. We have shown, however, that essentially the same results are obtained if we assume LFs+Rescale. On this view, the logicality of language is paired with a relatively standard conception of logical form, except that it is enriched with the hypothesis that open class terms can be optionally modulated via a covert Rescale operator, which I argued is independently needed (see §3.3). I now try to show that, in key cases where their predictions differ, LF+Rescale makes better predictions. §5.1 presents cases in which Skeletons systematically overgenerates assignments of unacceptability, and in §5.2-§5.3 cases in which it undergenerates assignments of unacceptability. Crucially, the cases explored in §5.2-§5.3 constitute—together with *there*-existentials, connected exceptives, and negative islands in comparatives—core accounts within the overall argument for the logicality of language. Taken together, these results strongly suggest that the logicality of language should be paired with a view of logical form akin to LF+Rescale.

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5.1 Contradictions with variable co-binding of predicates

We begin by examining cases involving co-binding of predicative variables in which the two views of logical form make different predictions, and only LF+RESCALE generates the correct ones. Take a sentence such as (47), which is superficially trivial but not L-trivial, and consider the variant in (48), which involves co-binding of the tokens of *tall*, as represented by its logical form in (48-a). Gajewski (2009) admits that this variant, which can be systematically generated for other acceptable trivial sentences, presents a problem for the notion of L-triviality.[18] Assume, as seems required, that these binding relations are seen by the Grammar, hence must be encoded by logical skeletons. It follows that L-triviality can be easily proven for (48-a), which is therefore (by the logicality of language) predicted to be marked as unacceptable. However, (48) is, even if odd, clearly not ungrammatical. In addition, this is precisely what is predicted by LF+RESCALE. For on this view, (48) can have the logical form in (48-b), which is preferred over the contradictory and hence marked logical form in (48-a).

(47) Bill is tall and Bill isn't tall.

(48) Tall is what Bill is and isn't.

a. Tall is [what$_1$ Bill is t_1 and is not t_1]
b. Tall is [what$_1$ Bill is t_1 and is not $\text{RESCALE}_c(t_1)$]
c. Tall is [what$_1$ Bill is $pos_c(t_1)$ and is not $pos_{c'}(t_1)$]

Gajewski (2009) concludes that cases such as (48) present an open problem for the pairing of the logicality of language with logical skeletons. Still, it might be tempting to respond on his behalf as follows. Assume that gradable adjectives are degree functions of type $< e, d >$, which can occur with a covert degree morpheme *pos* of type $<< e, d >, < e, t >>$ (Kennedy & McNally 2005; Kennedy 2007). *Pos* determines the relevant standard, as a function of context, for an object to fall under the adjective which is its argument. If we can leave *pos* in situ when we move the adjective, one possible logical form for (48) would be (48-c). Recall that various frameworks allow that contexts are updated as information is processed, such that $c \neq c'$. It follows that since each token of *pos* could determine a different standard, the deductive system cannot treat (48-c) as a contradiction.

The problem with this response is that it doesn't generalize to simple variations of the original example. Specifically, we can construct examples with explicitly scoped out overt degree morphemes, such as (49). Furthermore, the proposed response cannot be applied to variations with non-gradable adjectives, such as (50). In short, the simple variations in (49) and (50) are still incorrectly predicted to be L-trivial, hence marked. In contrast, LF+RESCALE again makes the correct predictions: it generates for (49) the logical form in (49-a) and for (50) the logical form in (50-b), neither of which is L-trivial.

(49) 2 meters tall is what Bill is and isn't.

a. 2m tall is [what$_1$ Bill is t_1 and isn't $\text{RESCALE}_c(t_1)$].
≈ Bill is around 2m tall but is not exactly 2m tall.

(50) Raining is what is and isn't happening.

a. Raining is [what$_1$ is t_1 and is not t_1 happening]
b. Raining is [what$_1$ is t_1 and is not $\text{RESCALE}_c(t_1)$ happening]

18 Gajewski (2009) attributes this observation to Danny Fox.

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These examples might feel odd, especially when considered out of the blue. Indeed, they might be in tension with other principles, such as principles of manner or economy. The point here is just that they are clearly not marked as ungrammatical, which is the prediction made by LFs+Rescale, but not by Logical skeletons. One could of course hold that logical skeletons can include a mechanism of nominal/verbal restriction, perhaps along the lines of Rescale. If a solution along these lines is accepted, however, the need to distinguish between acceptable trivialities such as those in (23), and the unacceptable trivialities involving the distributions of quantifiers examined in §2, can no longer be a reason to adopt Logical skeletons, as demonstrated in §4.

Importantly, cases of acceptable trivialities involving co-bound variables present a systematic problem for Logical skeletons. In contrast, most of these cases can be easily handled by LF+Rescale.[19] To consider a different kind of case, take (51), suggested by a reviewer. Note that (51) contains a trivial embedded question. Suppose Mary and Peter are discussing John's strange recent behavior. Exasperated, Peter utters (51). Although the embedded question is a superficial contradiction, (51) is not ungrammatical, and can be easily rescued in this context. Assuming Hamblin (1973)'s account of questions, the logical form and meaning of the embedded question in (51) would be (51-a) and (51-b) respectively. Since the predicative variables in the embedded question are co-bound by *what*, the logical skeleton cannot generate independent variables. As a result, each proposition in the set of possible answers will be seen as a contradiction, as shown in (51-b). In contrast, LF+Rescale also generates the logical form in (51-c), which in this context can denote the set of non-contradictory propositions in (51-d). This view correctly predicts that, in this scenario, the discourse in (52), where Mary's assertion entails that John is a friend but not a good friend, is perfectly coherent.

(51) I wonder what John is and is not.

a. what_1 John is t_1 and John is not t_1
b. {p: ∃Q[p = John is Q and John is not Q]}
c. what_1 John is t_1 and John is not $\text{Rescale}_c(t_1)$
d. ≈ {John is a cousin and not a good cousin, John is a friend and not a good friend, John is a partner and not a good partner, . . . }

(52) a. Peter: I wonder what John is and is not.
b. Mary: A friend . . .

Another manifestation of the problem of co-bound variables for Skeletons involves trivial sentences with reflexive pronouns (Gajewski 2009). Presenting a full account of the target acceptability patterns is a difficult and controversial task which I cannot embark here. Still, let us briefly consider two representative examples which illustrate the prima facie advantage of LF+Rescale over Skeletons in this domain.

The first example consists of comparatives, such as (53), in which the clausal comparative contains a reflexive pronoun. Although acceptability intuitions are in this case a bit fuzzy, it seems that (53) is strictly acceptable. To nudge your intuitions, suppose (53) is uttered by Peter in a situation where John is outshining his usual self, as in *Look at John debate today! He is simply smarter than himself!*, used to say that John is smarter than he typically is. Assuming the account of comparatives presented in §2.3, and a bound variable

19 I'm grateful to an anonymous reviewer for emphasizing this point, and for providing me with a range of insightful examples and initial analyses. The rest of the discussion in this section is greatly indebted to the reviewer's constructive comments.

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account of reflexives, Skeletons incorrectly predicts that (53) is, when defined, trivially false, hence strictly unacceptable. This can be seen from its logical skeleton in (53-b). In contrast, LF+RESCALE generates a logical form for (53)—spelled out in (53-c)—which captures the target reading. In this case, RESCALE works as an adverbial modifier, and the sentence could be resolved in context to say that there is a degree d such that John is at some salient time/location d-smart, although he is not typically d-smart.

(53) John is smarter than himself.
  a. John $\lambda 1$ $\exists$d [t_1 is d-smart and t_1 is not d-smart]
  b. John $\lambda 1$ $\exists$d [t_1 is d-$P_{1,<d,<et>>}$ and t_1 is not d-$P_{2,<d,<et>>}$]
  c. John $\lambda 1$ $\exists$d [t_1 is RESCALE_c d-smart and t_1 not is $\text{RESCALE}_{c'}$ d-smart]

The second example of acceptable trivialities with reflexives is illustrated by the superficially simple sentence in (54). To nudge intuitions, consider again the scenario in which Mary and Peter are dismayed by John's recent uncharacteristic behavior. Clearly, they can discuss John's behavior using stylistic variants of *John is/is not himself*, meaning that John is/is not behaving in characteristic ways. LF+RESCALE generates an appropriate logical form for this kind of acceptable target reading. To see this, let us assume, plausibly, that the target reading involves predication and not directly identity. Accordingly, *himself* has to be type-shifted to a predicate, which can be done via the *ident* operator (Partee 1986b,a), as illustrated in (54-b). The output of this operation is '$\lambda x.\ x = t_1$'. This resolves the type mismatch but results, in this environment, in a clear triviality, namely, '$[\lambda x.\ x = t_1](t_1)$'—which is still trivial given its logical skeleton. However, since '*ident*(himself$_1$)' is a predicate, it can be modified by RESCALE, as shown in (54-c). The output of this intersective modification can be represented as '$\lambda x.\ x = t_1 \wedge P_c(x)$'; which is not trivial in this environment—i.e., in '$[\lambda x.\ x = t_1 \wedge P_c(x)](t_1)$'—and captures the target reading. For example, suppose that, in c, P is assigned a property of John at his best, e.g., generosity; we then get $[\lambda x.\ x = t_1 \wedge \text{generous}(x)](t_1)$.[20]

(54) John is himself.
  a. John $\lambda 1$ [t_1 is himself$_1$]
  b. John $\lambda 1$ [t_1 is *ident*(himself$_1$)]
  c. John $\lambda 1$ [t_1 is RESCALE_c *ident*(himself$_1$)]

5.2 Polarity items and contradiction

A key difference between Skeletons and LF+RESCALE is that only for the latter are classical formulas and inference rules, such as the Law of Non-contradiction (LNC) and Modus Ponens (MP), valid at the level of representation where acceptability/grammaticality is determined.[21] Here we focus on the LNC. To adopt Skeletons is to assume that the deductive system of language doesn't 'see' the identity of open class terms, to the extent that different tokens of the same term are treated as if independent. This entails that superficial con-

20 This account also captures the target reading of *John is not himself*. Consider again the scenario and assignments described above. Since 'John = John' is necessarily true, the statement 'not [John = John and John is generous]' is resolved to the claim that John is not generous, which corresponds to the intended reading. To be clear, I haven't provided an independent justification for this account of expressions like (54). Indeed, I am not sure whether they really present a problem for Skeletons, although Gajewski (2009) seems to think that they do. My aim here is just to show that LF+RESCALE provides us with key tools to explain why superficially trivial expressions with reflexives can be acceptable.

21 Relative to the familiar entries for the connectives and other relevant functional terms.

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tradictions such as (31) above are not seen as such, as captured in (31-a). The underlying generalization is simply that LNC doesn't hold given logical skeletons, since this formula is valid only if the dependency between non-logical terms is preserved, as in (31-b).[22] In contrast, according to LF+Rescale forms such as (31-b) can be seen by the language system, but since they are trivially false they are disfavored relative to potentially informative disambiguations where Rescale modifies (at least) one of the tokens of *raining*. The question, then, is this: Should the result that the LNC is valid if we adopt LF+Rescale but not if we adopt Skeletons be taken as support for the former view? There is no simple move to that conclusion. For the issue here concerns the properties of a natural deductive system, which could be radically different from classical systems. Furthermore, even if we adopt Skeletons, there is still a level of representation where the dependency between tokens of open class terms is recovered. Accordingly, one could hold that it is at this post-compositional level that classical formulas/rules of inference, including the LNC, apply (cf. Chierchia 2013).[23]

Still, this relative neutrality (with respect to the classicality of the natural deductive system) is available to proponents of the logicality of language only if the corresponding accounts of acceptability based on logical triviality do *not* depend on the validity of any of the formulas/rules of inference which are allegedly suspended at the level of representation where grammaticality is determined. Can this be maintained relative to the LNC? Admittedly, in the case of *there*-existentials, connected exceptives, and negative islands in comparatives we proved triviality—i.e., truth or falsity under all models—without assuming the LNC, and still captured the target acceptability patterns.[24] However, this is not the case for other key accounts based on the logicality of language, including Chierchia's (2006; 2013) influential account of the distribution of polarity sensitive items. Specifically, I will now argue that this account requires that the LNC be valid at the level of representation where the deductive system determines grammaticality, as entailed by LF+Rescale but not—at least without additional ad hoc stipulations—by Skeletons.[25]

Consider the distribution of the NPI *any*, illustrated in (55)-(56). According to Chierchia (2013), *any* is an indefinite with existential force which, unlike its plain counterpart *a/an*, obligatorily activates alternatives. This, in turn, triggers a process of automatic exhaustification which is the key component to explain the difference in the distribution of *any* and its plain counterparts.

(55) a. John doesn't have an egg.
b. John doesn't have any eggs.

(56) a. John has an egg.
b. *John has any eggs.

22 Gajewski is aware of this consequence of Skeletons. He notes that the basic idea has a precursor in Körner's (three-valued) logic of inexact concepts (1955; 1960), which provides truth tables that, as shown by Williamson (1994), effectively treat each token of a propositional variable as independent.

23 From this perspective, it is only at this level that we can engage in, e.g., pragmatic reasoning from Gricean maxims, since this presumably depends on respecting the LNC and MP. To be sure, one could also hold that pragmatic reasoning is determined or constrained by a kind of natural logic; but this system should then be strictly distinguished from the automatic deductive system of the language module. For a related discussion, see Szabó (2012) and Iacona (2017).

24 To be fair, since those are the main acceptability patterns examined by Gajewski (2002, 2009), he could consistently acknowledge and embrace a deductive system which treats all non-logical terms as independent.

25 Abrusán (2014: ch. 6) raises a similar point to argue that Logical skeletons, as the view is standardly conceived, must be substantially revised to allow for accounts of acceptability patterns which appeal to contradictions. This includes not only Chierchia's account of the distribution of polarity-sensitive items, but also various logicality based accounts—including Abrusán's own—of presuppositional, negative and other weak island effects. See §5.3 below.

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The mode of exhaustification and set of alternatives relevant to assertions with *any* is defined in (57). This definition will become clear once we apply it to some examples below. For now, note that (i) the second conjunct of (57-a) guarantees the negation of alternatives which are logically stronger than the prejacent, and (ii) the set of alternatives, as defined in (57-b), is just the domain restricted versions of the prejacent.

(57) a. $[\![O_{DA}\ \phi]\!]^{g,w} = [\![\phi]\!]^{g,w} \wedge \forall p \in [\![\phi]\!]^{DA}[p \rightarrow \lambda w'[\![\phi]\!]^{g,w'} \subseteq p]$
b. $[\![\phi]\!]^{DA} = \{[\![\phi]\!] : D' \subseteq g(D)\}$

To explain the distribution of *any*, two observations are crucial. The first is that, in downward entailing environments, the obligatory exhaustification triggered by *any* is empty and thus unproblematic. Consider (58). The prejacent—namely, that John doesn't have an egg—entails all the alternatives. To see this, suppose the relevant domain D (for brevity, we use 'D' below instead of '$g(D)$') concerns the eggs in John's house. That John doesn't have an egg in his house entails that John doesn't have an egg in any of its rooms. Recall that the second conjunct in (57-a) guarantees that alternatives which are entailed by the prejacent are not negated. So exhaustification is in this case vacuous and simply returns the prejacent.

(58) John doesn't have any eggs.
a. $\mathrm{O_{DA}}(\neg[\exists x \in D[\mathrm{egg}_w(x) \wedge \mathrm{have}_w(j,x)]])$
b. $\mathrm{DA} = \{\neg[\exists x \in D'[\mathrm{egg}_w(x) \wedge \mathrm{have}_w(j,x)]] : D' \subseteq D\}$

The second observation is that, in upward entailing environments, the obligatory exhaustification triggered by *any* generates contradictions. The key difference is that, in this case, the prejacent—namely, that John has an egg—doesn't entail any of the alternatives. Suppose John's house has a living room and a kitchen. That John has an egg doesn't entail that John has an egg in the living room, and it doesn't entail that John has an egg in the kitchen. Exhaustification will therefore negate these stronger alternatives and generate the proposition in (59-c), which is a contradiction.

(59) *John has any eggs.
a. $\mathrm{O_{DA}}(\exists x \in D[\mathrm{egg}_w(x) \wedge \mathrm{have}_w(j,x)]])$
b. $\mathrm{DA} = \{\exists x \in D'[\mathrm{egg}_w(x) \wedge \mathrm{have}_w(j,x)] : D' \subseteq D\}$
c. $\exists x \in D[\mathrm{egg}_w(x) \wedge \mathrm{have}_w(j,x)]$
$\wedge \forall D' \subseteq D[\neg\exists x \in D'[\mathrm{egg}_w(x) \wedge \mathrm{have}_w(j,x)]]$
$\approx$ John has an egg $\in D_{house}$ $\wedge\neg$John has an egg $\in D_{kitchen}$
$\wedge\neg$ John has an egg $\in D_{living_room}$

As in the cases in §2, the presence of trivial truth-conditions explains, given the logicality of language, why *any* is unacceptable in upward entailing environments. The key point, however, is that unlike for *there*-existentials, connected exceptives, and comparatives, in this case the triviality can be traced to a violation of the LNC. The problem is that this formula is not valid given logical skeletons: for its validity requires that the system respect the dependency between—i.e., the uniform substitutions of semantic values for—tokens of the same open class terms, as in (59-c). If we generate a logical skeleton for (59-c), shown in (60), we can immediately see that the result is not L-trivial:

(60) John has a $\mathrm{P}_1 \in D_{house}$ $\wedge\neg$John has a $\mathrm{P}_2 \in D_{kitchen}$
$\wedge\neg$ John has a $\mathrm{P}_3 \in D_{living_room}$

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In contrast to Skeletons, LF+RESCALE doesn't affect the account of NPIs such as *any*. The reason is simple. First, on this view violations of LNC can be identified. Second, application of RESCALE doesn't affect the monotonicity of the relevant environments, hence it doesn't change the basic outcomes of each case of obligatory exhaustification. To illustrate, consider (61), which is like (59) except that we introduced RESCALE to (try to) rescue it. Applied to this logical form, O_{DA} as defined in (57) has two key implications. First, O_{DA} is sensitive only to domain (and not syntactically simpler) alternatives, as captured in the formulation in (57-b). Since in (61) RESCALE is a constituent of the logical form of the prejacent, it must be present in all the domain alternatives DA. Second, an assignment function determines the value of the context parameter of RESCALE in (61). Since alternatives don't have a context of their own, but instead inherit their context from the utterance context of the source, it follows from (57) that this assignment must be uniform—i.e., the same parameter value assigned to the token of RESCALE in the prejacent is assigned to each token in each alternative. Again, the only variation allowed for each item in DA is in the domain of the existential quantifier.[26] This generates the contradiction in (61-c):

(61) *John has any $\textsc{Rescale}_c$(eggs).

a. $\mathrm{O}_{\mathrm{DA}}(\exists x \in D[\textsc{Rescale}_c(\mathrm{egg}_w)(x) \wedge \mathrm{have}_w(j,x)]])$
b. $\mathrm{DA} = \{\exists x \in D'[\textsc{Rescale}_c(\mathrm{egg}_w)(x) \wedge \mathrm{have}_w(j,x)] : D' \subseteq D\}$
c. $\exists x \in D[\textsc{Rescale}_c(\mathrm{egg}_w)(x) \wedge \mathrm{have}_w(j,x)]$
$\wedge \forall D' \subseteq D[\neg\exists x \in D'[\textsc{Rescale}_c(\mathrm{egg}_w)(x) \wedge \mathrm{have}_w(j,x)]]$

In short, LF+RESCALE doesn't affect Chierchia's basic account of the distribution of *any*. In particular, we need not make any additional or ad hoc stipulations to preserve the basic explanation of why, in upward entailing environments, *any* generates contradictions and is thus unacceptable.

In light of this, consider the following response on behalf of Skeletons. Instead of taking blindness to open class terms as a kind of general property of the language system at the relevant level, think of the algorithm for logical skeletons, specified in (24) above, as a kind of rule. This rule can be applied to generate a logical skeleton for (59) either before or after we get the relevant alternatives. The previous objection holds only if we apply the rule *after* we generate the relevant alternatives. If, however, we apply the rule *before* we generate alternatives, we would get the alternatives to 'copy' the skeleton, as in (62-b), and thus get a contradiction, specified in (62-c).

(62) *John has any eggs.

a. $\mathrm{O}_{\mathrm{DA}}(\exists x \in D[\mathrm{P}_w(x) \wedge \mathrm{have}_w(J,x)]])$
b. $\mathrm{DA} = \{\exists x \in D'[\mathrm{P}_w(x) \wedge \mathrm{have}_w(J,x)] : D' \subseteq D\}$
c. $\exists x \in D[\mathrm{P}_w(x) \wedge \mathrm{have}_w(J,x)]$

26 The requirement that there be a uniform assignment for the open parameter for each token of RESCALE in the prejacent and its alternatives is independently motivated. This is how, in general, we must treat the context sensitive parameters of (non-focused) characters in the prejacent and their corresponding alternatives. For example, an assertion of *some$_F$ of the walls in [that house]$_1$ are red* in response to the question *do you know any house which is totally red?*, would invoke the alternative *all of the walls in [that house]$_1$ are red*, where the index/value of *that house* is fixed across alternatives. For another kind of example, consider assignments of comparison classes. Suppose John wants to buy a soccer team with only tall players. Knowing this, Peter tells John that *some$_F$ Man U players are tall*; a relevant alternative in this case is *all Man U players are tall*, where the same comparison class is used in the assertion and its alternatives (e.g., 'tall for a soccer player').

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$\wedge \forall D' \subseteq D[\neg\exists x \in D'[\mathrm{P}_w(x) \wedge \mathrm{have}_w(J, x)]]$
$\approx$ J has a P $\in D_{house}$ $\wedge\neg$J has a P $\in D_{kitchen}$
$\wedge\neg$ J has a P $\in D_{living_room}$

This response is technically available to proponents of Skeletons, but it comes with a price. Once it is adopted, logical skeletons can no longer be understood as resulting from a general property of the language system at the level where grammaticality is determined (cf. Chierchia 2013; Fox & Hackl 2007). The theoretical assumptions which underlie the view that the language system doesn't 'see' or 'care' about open class terms would have to be revised. In its place, proponents would have to hold that the deductive system of language can sometimes see and sometimes not whether different tokens are of the same open class term. In contrast, LF+Rescale, which preserves the validity of LNC, can accommodate the basic account of NPIs without making any ad hoc/additional stipulations. Most importantly, note that the problem posed to Skeletons by the logicality-based account of polarity distribution, when taken together with that posed by acceptable contradictions with co-binding (see §5.1), suggests that any potential reformulation of Skeletons will be rather ad hoc. For, on one hand, to account for the unacceptability of NPIs in upward entailing environments, we would need to stipulate that the deductive system can see contradictions when induced by conjoining the prejacent and its negated domain alternatives. This is possible only if logical skeletons do encode when tokens are copies of particular open class terms. On the other hand, to allow for the acceptability of (superficial) contradictions involving co-bound predicates, we would need to say that tokens of open class variables, formally co-bound by an open class term, are somehow *not* encoded as such by logical skeletons.

5.3 Weak presuppositional islands in manner questions

The last case in support of LF+Rescale that we'll discuss centers around Abrusán's (2011a; 2014) logicality-based account of weak presuppositional islands in manner questions. Abrusán's account of this and other weak island constraints together constitute a key piece of evidence for the logicality of language. Hence supporters of this hypothesis should adopt a notion of logical form that is compatible with Abrusán's account, even if there is disagreement on the details. Furthermore, this discussion will allow us to explore some central issues, relevant to various accounts in this tradition, concerning the logicality of language and the formal status of attitude verbs. In recent work (2014: ch. 4), Abrusán has already argued that her logicality-based account of weak islands is not compatible with Skeletons. In this section, I develop a reasonable response on behalf of Skeletons, and then present some novel considerations for Abrusán's conclusion. Finally, I show that LF+Rescale coheres perfectly with Abrusán's account of weak presuppositional islands.

The target generalization is that *wh*-words that range over manners can escape weak islands when embedded under a non-factive attitude verb (e.g., *hope, desire*), but not when embedded under a factive one (e.g., *regret, know*). This basic pattern is illustrated in (63), and contrasted with the pattern displayed by the identity questions in (64):

(63) a. *How does John regret that Peter fixed the car?
b. How does John hope that Peter fixed the car?

(64) a. Who does John hope fixed the car?
b. Who does John regret fixed the car?

Abrusán (2011a, 2014) argues that the best explanation for this pattern is that, in these

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manner questions, factive verbs generate contradictory presuppositions. This logicality-style account is based on two premises. The first is that, in this environment, the presence of a variable in the scope of a factive verb results in a universal presupposition. This is illustrated in (65):

(65) Who among these ten people does Mary regret that Bill invited?
  a. $\lambda p.\exists x[x \in \{\text{these ten people}\} \wedge p = \lambda w'$: Mary believes$_{w'}$ that Bill invited x. Mary regrets$_{w'}$ that Bill invited x
  b. **Presupposition:** $\forall x \in \{\text{these ten people}\}$: Mary believes that Bill invited x

In light of this, consider again the unacceptable example (63-a), repeated in (66), of a weak island violation. At first glance, the universal presupposition of the question, captured in (66-b), seems innocent: it just says that Mary believes that Peter fixed the car in each of a given set of ways.

(66) *How does John regret that Peter fixed the car?
  a. $\lambda p.\exists \alpha[\alpha \in D_M \wedge p = \lambda w'$: John believes$_{w'}$ that Peter fixed the car in way α. John regrets$_{w'}$ that Peter fixed the car in way α]
  b. **Presupposition:** $\forall \alpha \in D_M$: John believes that Peter fixed the car (i.e., Peter's car fixing event e) in way α

The second premise of Abrusán's account, however, is that domains of manners always contain contraries. Contrary manners—e.g., *carefully* vs. *carelessly*, *slowly* vs. *quickly*—cannot both be true of the same event, although they can both be false. On this view, any contextual assignment of a set of relevant manners, $g(D_M)$, has the following property: for every manner predicate $P \in g(D_M)$ there is another $P' \in g(D_M)$ such that $P \cap P' = \emptyset$. Given these two premises, we can now identify the problem with (66-b): if, say, {*careful, erratic*}$\in g(D_M)$ the presupposition of (66) is that John has the incoherent belief that Peter's car fixing event e was careful and erratic.[27]

The question that concerns us here is whether Abrusán's logicality-style account can be maintained in Skeletons and in LF+Rescale. According to Abrusán (2014), the target difference between (63-a) and (63-b) cannot be computed from their corresponding logical skeletons. To see why, consider their (partial) logical skeletons in (67-a) and (67-b). Since attitude verbs like *regret* and *hope* are (on most accounts) open class terms of the same semantic type, Skeletons entails that they should be replaced with different variables of the same type. As a result, a deductive system operating on these skeletons is blind to the original difference in their presuppositions. Since factivity is not a property of all verbal predicates that take propositional complements, we cannot stipulate it as a general constrain on $D_{<e,<<s,t>t>>}$. In short, a deductive system operating on logical skeletons cannot distinguish between (67-a) and (67-b), and thus fails to predict the contrast in their acceptability.

27 Note that the source of unacceptability, in the example with *regret*, is the *attribution* of a contradictory/incoherent belief. This is quite different from generating a contradiction. The latter cannot be entailed by any context, but presumably there are contexts that entail/admit that some agent has contradictory beliefs. Parallel manner questions with *knows* presumably generate a stronger presupposition. Still this account might ultimately need an additional stipulation such that contradictions/tautologies are banned in every environment, including as complements of attitude verbs (this is compatible with allowing logical forms with acceptable superficial trivialities that, *after* contextual saturation, can be resolved to contradictions/tautologies, as I argued in §3.3).

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(67) a. *How does John regret that Peter fixed the car?
{John $V_{1,<e,<<s,t>t>>}$ that Peter VP_1 in way $\alpha : \alpha \in D_M$}
b. How does John hope that Peter fixed the car?
{John $V_{2,<e,<<s,t>t>>}$ that Peter VP_2 in way $\alpha : \alpha \in D_M$}

In contrast, Abrusán's account can be maintained in LF+RESCALE without making any ad hoc stipulations. We have seen that the difference between unacceptable cases with factives like (67-a) and acceptable cases with non-factives like (67-b) can be proven given standard logical forms, so we only need to show that RESCALE cannot rescue the cases with factives. Two observations are crucial. First, attitude verbs like *regret* can be modified, as in *John superficially regrets what he did, but he doesn't truly regret it.* Secondly, intersective modifiers do not in general change the presuppositions of their arguments or sisters: e.g., *John partially regrets that* ϕ and *John regrets that* ϕ have the same presupposition (on this account, that John believes that ϕ). The simplest assumption about RESCALE, in this domain, is that it behaves like its overt counterparts. Accordingly, for any context c, *John* RESCALE_c *knows that* ϕ entails ϕ, and *John* RESCALE_c *hopes that* ϕ does not entail ϕ. It follows that RESCALE cannot rescue the unacceptable manner questions:

(68) a. *How does John RESCALE_c regret that Peter fixed the car?
b. *How does John really regret that Peter fixed the car?

(69) a. How does John RESCALE_c hope that Peter fixed the car?
b. How does John really hope that Peter fixed the car?

Now, we can also try to rescue (66)/(67-a) by adding RESCALE as an adjunct to the trace of *how*. The effect of this modification would be a relevance restriction on the set D_M. However, Abrusán's account is based on the stipulation that any domain D_M of manners, independently of how it is contextually restricted, comes with pairs of contraries. A fortiori, any restriction by RESCALE would output a subdomain of manners that still includes pairs of contraries.

There is, however, a way of revising Skeletons which can be used to capture the target acceptability patterns for manner questions (cf. Fox & Hackl 2007; Mayr 2017). The basic idea is this. Attitude verbs have a quantificational component, and in this respect are like some logical terms. We can thus decompose each of these items into a logical and a non-logical component. Each items factivity, or lack thereof, can be encoded in its logical component. This is illustrated in the lexical entries (70) and (71)—note that what is erased in the corresponding skeletons for *know*, in (70-b), and *hope*, in (71-b), is just the specific accessibility relation. With this revision, the contrast between the unacceptable manner question in (67-a) and the acceptable one in (67-b) can be computed from their logical skeletons.

(70) a. $[\![know]\!] = \lambda p.\lambda x.\lambda w : p(w) = 1.\ \forall w'[w' \in Dox_{x,w} \rightarrow p(w') = 1]$
b. **Skeleton:** $\lambda p.\lambda x.\lambda w : p(w) = 1.\ \forall w'[w' \in \mathbf{R}_{x,w} \rightarrow p(w') = 1]$

(71) a. $[\![hope]\!] = \lambda p.\lambda x.\lambda w.\ \forall w'[w' \in Hop_{x,w} \rightarrow p(w') = 1]$
b. **Skeleton:** $\lambda p.\lambda x.\lambda w.\ \forall w'[w' \in \mathbf{Q}_{x,w} \rightarrow p(w') = 1]$

This revision of Skeletons, however, gives rise to a version of the glitch (see §3) for attitude verbs, the solution of which arguably requires that we independently appeal to RESCALE. Consider the examples in (72) and (73), all of which are strictly acceptable. Assuming that the factivity of *knows* is encoded in logical skeletons, the examples in (73)

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each seem to entail a contradiction which can be seen by the deductive system. Now, we can still account for the acceptability of (73-a) by noting that the complement of each token of *knows* is assigned a different logical skeleton. However, this solution is not available for (73-b), for reasons familiar from the discussion of variable co-binding in §5.1. Specifically, (72-b) and (73-b) involve the co-binding of propositional variables. Assuming factivity can be read from logical skeletons, (73-b) entails a contradiction, and is thus incorrectly predicted to be marked as unacceptable.

(72) a. John believes that God exists and he also believes that God does not exist.
b. That God exists is what John believes is the case and also believes is not the case.

(73) a. John knows that God exists and he also knows that God does not exist.
b. That God exists is what John knows is the case and also knows is not the case.

In contrast, LF+RESCALE correctly predicts the acceptability of these examples. At first, one might be tempted to explain this by appealing to logical forms in which the attitude verbs are modified, as in (74-a)-(74-b). However, since modification with RESCALE cannot affect the presuppositions of the corresponding attitude verb, these logical forms still predict a contrast, such that only (74-b) entails a contradiction and is thus marked as unacceptable.

(74) a. That God exists is what John RESCALE$_c$ believes is the case and also RESCALE$_{c'}$ believes is not the case.
b. *That God exists is what John RESCALE$_c$ knows is the case and also RESCALE$_{c'}$ knows is not the case.

Recall from the discussion of superficial contradictions in §3.2 that LF+RESCALE generates a logical form for sentences like *God exists* as *God* [RESCALE$_c$ *exists*]. So LF+RESCALE generates a logical form with covert RESCALE for the topicalized clause, as in (75-a) and (76-a). In this case, (76-a) no longer entails a contradiction, and is correctly predicted to be strictly acceptable, just like (75-a).[28] This logical form accounts for the default reading in contexts such as this: 'That God exists is what John knows is and is not the case. He knows God exists in each of us, but also knows that God isn't anything beyond that.'

(75) a. That God RESCALE$_c$ exists is what John believes is the case and also believes is not the case.
b. John believes [God RESCALE$_{c'}$ exists] and believes not [God RESCALE$_{c''}$ exists]

(76) a. That God RESCALE$_c$ exists is what John knows is the case and also knows is not the case.
b. John knows [God RESCALE$_{c'}$ exists] and knows not [God RESCALE$_{c''}$ exists]

I should add that, even if some of the details of Abrusán's account of weak presuppositional islands in manner questions are rejected, our main results still bear on various logicality-based accounts in which the non/factivity of attitude verbs plays a key explanatory role by generating trivialities. This includes Abrusán's (2011b) account of *wh*-islands

28 Note that the value of the contextually sensitive parameter of RESCALE can be different at each cite. This assumption, which also holds of other overt characters in similar constructions, is independently motivated. For example, in the default interpretation of (i), the comparison class of *tall* can vary at each position.

(i) Distinctively tall is [what$_1$ Mary was t_1 in kindergarten and also t_1 in college].

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and Mayr's (2017) recent account of interrogative embeddings. Although I can't further defend that claim here, I hope this discussion suggests that these sorts of accounts are best pursued within a version of the logicality of language that is paired with LF+Rescale rather than with Skeletons.

6 Conclusion

The logicality of language is one of the most important hypotheses about the computational architecture of language to come out of recent work in formal semantics. It issues in elegant accounts of general acceptability patterns involving the distribution of not only quantificational determiners (§2), but also scalar implicatures, polarity sensitive items (§5.2), adverbs, verbs, and attitude verbs in presuppositional (§5.3) and negative islands (Dowty 1979; Fox 2000; Fox & Hackl 2007; Gajewski 2008b,a; Chierchia 2006, 2013; Abrusán 2011a,b, 2014; Mayr 2017). The main task of this paper was to explore which notion of logical form should be paired with the logicality of language. Minimally, any plausible candidate should have the result that, when combined with the assumption that the deductive system automatically filters out trivial expressions, it does not also incorrectly predict that acceptable trivial sentences, such as those in (23), are marked as unacceptable.

The dominant response, we have seen, is to wed the logicality of language with the view that, at the level of representation where grammaticality is determined, logical forms are logical skeletons. The implications of this move should not be underestimated. It entails that compositional operations are blind to the content, and even the character, of all open class words. This results in a particular division between semantics and pragmatics which opens a considerable gap between the outputs of the compositional semantics and intuitions about what is said. Not only are truth-conditions the product of post-compositional pragmatic processes, but even the characters of complex expressions are not fully determined by linguistic compositional processes. The resulting view, in which semantics plays a minimal role within the language system, is reminiscent of positions advocated by Chomsky (2005, 2013). Adopting logical skeletons also has substantial implications for our conception of the automatic deductive system. The end-result of seeing every token of an open class term, hence every sentential clause, as if it was independent is that the deductive system cannot see/follow classically valid formulas and rules such as LNC and MP, or indeed almost any inference rules at all (see Williamson 1994: ch.4 on Körner's 1955; 1960 three-valued logic).

The main contention of this paper is that distinguishing between L-trivial and acceptable trivial sentences within the basic framework of the logicality of language doesn't require endorsing Skeletons. There is at least one more live option, LF+Rescale, which is based on more standard assumptions about the information encoded in logical forms. In particular, on this view language can see when different tokens are of the same open class terms, and as a consequence can be paired with a deductive system which follows classical rules such as MP. Indeed, if we are correct about the comparative advantages of this view, then its ability to adequately distinguish between L-trivial and acceptable trivial sentences is a good reason for including something like Rescale—i.e., some optional item for modulation of open class terms—in our accounts of logical form. This constitutes a significant piece of evidence, so far overlooked, in favor of families of 'contextualist' frameworks which allow, albeit in different ways, some fine tuning of nouns and other open class terms within the compositional semantics (e.g., Pagin & Pelletier 2007; Recanati 2010; Stanley 2000; Szabó & Stanley 2000; Sauerland 2014; Martí 2006; Lasersohn 2012; Dekker 2014).

At the same time, the argument presented here issues in a substantial constraint on all

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modulation-friendly frameworks that accept the logicality of language. In our implementation, RESCALE does *not* apply to any logical or functional terms. Otherwise, we would risk—and in some cases certainly lose—the accounts of why some L-trivial sentences are marked as unacceptable and cannot be rescued. For if we could modify the meaning of logical terms, some L-trivial sentences would arguably be rescued. For example, consider the entry for ⟦*but*⟧ in (14-b) above, and suppose that, in some cases, we could modulate its meaning by dropping the conjunct which specifies the 'least you have to take out' condition. Given this flexibility, we should be able to rescue *some students but Mary passed the exam*, and incorrectly predict that it has an acceptable (and potentially quite informative) reading along the lines of 'some students passed the exam, and Mary need not be in that group'. In short, if logical/functional terms could be modulated, some L-trivial expressions should be odd but not strictly unacceptable. Since this is not the case, we conclude that functional terms are not modulated by the language system. Some views which allow semantic modulation respect this constraint (e.g., Stanley 2000; Szabó & Stanley 2000; Martí 2006), but others are formulated in a way which allows, in principle at least, modulation of all terms (e.g. Recanati 2010; Lasersohn 2012), and hence should be constrained along the lines suggested here.

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