The Dynamics of Loose Talk

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Abstract

In non-literal uses of language, the content an utterance communicates differs from its literal truth conditions. Loose talk is one example of non-literal language use (amongst many others). For example, what a loose utterance of (1) communicates differs from what it literally expresses:

(1) Lena arrived at 9 o'clock.

Loose talk is interesting (or so I will argue). It has certain distinctive features which rvaise important questions about the connection between literal and non-literal language use. This paper aims to (i.) introduce a range of novel data demonstrating certain overlooked features of loose talk, and (ii.) develop a new theory of the phenomenon which accounts for these data. In particular, this theory is motivated by the need to explain minimal pairs such as $(1^{\&}_{\neg})$-$(1^{\neg}_{\&})$:

$(1^{\&}_{\neg})$ Lena arrived at 9 o'clock, but she did not arrive at 9 o'clock exactly.

$(1^{\neg}_{\&})$?? Lena did not arrive at 9 o'clock exactly, but she arrived at 9 o'clock.

$(1^{\&}_{\neg})$ and $(1^{\neg}_{\&})$ agree in their truth conditions. Yet they differ in felicity. As such, they constitute a problem for any account which hopes to predict the acceptability of the loose use of a sentence from its truth conditions and the context of utterance alone.

Instead, it will be argued, to explain loose talk phenomena we must posit an additional layer of meaning outstripping truth conditions. This layer of meaning is shown to exhibit a range of properties, all of which point to its being semantically encoded. Thus, if correct, the theory provides a new example of how semantic meaning must extend beyond literal, truth-conditional content.

1 Speaking Loosely[1]

Utterances of (1)-(3) admit a loose reading in their respective contexts:

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(1) Lena arrived at 9 o'clock.
Context: The interlocutors are attempting to determine who was at the party before midnight.
Circumstance: Lena arrived at 9.02pm.

(2) The fridge is empty.
Context: The interlocutors are attempting to determine whether there is sufficient food to make dinner.
Circumstance: There are 3 eggs, a bottle of beer and half a pot of yoghurt in the fridge.

(3) Chicago is 800 miles from New York.
Context: The interlocutors are attempting to decide whether to drive from NY to Chicago in a single day.
Circumstances: Chicago is 796 miles from NY.

Call utterances which admit a reading of this kind **loose utterances**. (1)-(3), as uttered in their contexts, exhibit two features which are characteristic of—though by no means exclusive to—loose utterances.[2]

First, the content conveyed by an utterance of (1)-(3) in context differs from the content which it literally expresses. An utterance of (1), taken literally, expresses that Lena arrived at precisely 9pm. In contrast, in its context the utterance conveys that Lena arrived at some time close to 9pm.[3] Call the latter the **communicated content** of the utterance and the former its **literal content**.

The contrast between literal and communicated content might be helpfully glossed in terms of the distinction between the truth conditions of the uttered sentence (in context) and what credulous hearers of the utterance can be expected to believe upon hearing it. An utterance of (1) in its specified context is true iff Lena arrived at 9pm precisely. However, credulous hearers of the utterance can be expected to update their doxastic state with, at most, the weaker information that Lena arrived close to 9pm.[4]

[2]The same features are exhibited by, e.g., instances of metaphor, irony, hyperbole, etc.. I will make no attempt to identify a sharp boundary between these phenomena. Indeed, it might reasonably be supposed that there is no sharp boundary to be found. For example, it may be vague whether 'I could eat everything in sight' should be treated as an instance of loose talk rather than—or in addition—being hyperbole. Similarly with whether 'Stalin was the new Tsar of post-imperial Russia' should be treated simply as metaphor or qualify as loose talk in virtue of conveying that, in all relevant respects, Stalin had the properties of a Tsar.

It may be that the most theoretically relevant distinction is one based on the different operators with which the phenomena interact. Thus, metaphorical phenomena would be those which can be modified by 'figuratively/literally'-type operators, whereas loose-talk phenomena would be those which can be modified by 'exactly/roughly'-type operators.

[3]Note that 'loose talk'-phenomena are features of utterances rather than sentences. Correspondingly, it is particular utterances of sentences, rather than the sentence-types themselves which can be attributed communicated content.

[4] As observed by Bach (2001) loose talk phenomena can also be exhibited by utterances with true literal content. For example, an assertion of (1) will be true if Lena in fact arrived at precisely 9pm. Yet it might nevertheless qualify as a loose utterance, if it communicates only the weaker content that Lena arrived at some time around 9pm.

Second, utterances of (1)-(3) in context are felicitous, despite the fact that the literal content of the sentence uttered is false. For example, it would be inappropriate to criticize a speaker for asserting (1) by citing the fact that Lena didn't arrive at 9pm precisely. A response to the assertion which pointed out that, as a matter of fact, she arrived at 9.02pm would be, while not inaccurate, irrelevant to the felicity of the original utterance.

It might be tempting to suppose that, in fact, (1)-(3) have a true proposition as their literal content in their respective contexts. Perhaps the most natural way to develop this position would be to posit a form of polysemy. For example, in addition to the use on which it denotes a particular instant, '9 o'clock' could be taken also to have a lexically available reading on which it denotes the interval [8.55pm, 9.05pm] (and, presumably, further readings for greater and lesser intervals centred on 9pm) under which (1) is true. Likewise, 'empty' would need to be attributed a reading on which it is compatible with the presence of some leftovers, and '800 miles' one on which it denotes some interval of distances including 796 miles.

Lasersohn (1999, 533-535), however, presents strong evidence that loose utterances should be treated as strictly false in circumstances of evaluation like those of (1)-(3). Asserting ($1_\perp$)-($3_\perp$) appears infelicitous at any context:

($1_\perp$) (a.) Lena arrived at 9pm, but (b.) she did not arrive before 9.02pm.

($2_\perp$) (a.) The fridge is empty, but (b.) it is not empty.

($3_\perp$) (a.) Chicago is 800 miles from New York, but (b.) New York is not more than 796 miles from Chicago.

The obvious explanation is that ($1_\perp$)-($3_\perp$) express contradictions—both their literal and communicated contents are necessarily false. Yet, on any treatment of loose talk on which the truth conditions of a loose utterance are identified with its communicated content, this explanation will be unavailable. In order to account for the felicity of (1) in context it must have a reading on which is true if Lena arrived at 9.02pm. Yet, on any such reading, ($1_\perp$.a) will be consistent with some reading of ($1_\perp$.b). For example, on a treatment of loose talk as polysemy, there is predicted to be a use of '9 o'clock' and '9.02pm' which would generate a consistent reading of ($1_\perp$) (and, likewise, ($2_\perp$)-($3_\perp$)).

There is an natural rejoinder. The proponent of the polysemy view could posit constraints on the simultaneous resolution of polysemy. For example, she might claim that, where '9 o'clock' and '9.02pm' co-occur in a sentence, their (alleged) polysemy must be resolved in a way that ensures that their denotations are disjoint. Similarly, to account for ($2_\perp$) it might be claimed that the alleged polysemy of each occurrence of 'empty' in the sentence must be resolved in the same way. Clearly, this strategy would not account for discourses in which the relevant expressions occur in distinct sentences. It is also not clear that it accords with the behaviour of more typical examples of polysemy; for example, 'Mary's lunch was delicious, but Tom's lasted hours' is felicitous, despite requiring distinct resolutions of the polysemy of lunch in each conjunct. However, any attempt to assimilate the phenomenon of loose talk to polysemy also faces a more general worry. Standard examples of polysemous expressions are neutral with respect to their various resolutions. Neither the event nor object reading of ‘lunch’ can be plausibly identified as the correct meaning of the noun. In contrast, in examples of loose talk, the strongest reading associated with the loosely used expression occupies a privileged status. This privileged status, as discussed below, is reflected in its ability to be uniquely accessed by adverbial modifiers such as ‘exactly’, ‘precisely’, etc..

If the literal and communicated content of (1)-(3) differ (in their contexts), two key questions can be distinguished:

Q1: How is the communicated content of a loose utterance determined?

Q2: Given that a loose utterance can be felicitously performed despite being false, what determines the felicity of a loose utterance?

The central aim of the paper is to provide a unified answer to these two questions. In §§4-5 I will argue that the communicated content and felicity of a loose utterance are primarily determined by semantic properties of the sentence uttered, properties which outstrip its truth conditional content. These semantic properties are to be characterized in terms of the dynamics of loose talk—the way in which one utterance can change the context at which downstream utterances in the conversation are evaluated. A systematic theory of the dynamics of loose talk is given an informal introduction, in §6, and then developed within a formal framework, in §7. Finally, in §§8-9, I consider how the interaction of pragmatic and semantic factors can explain residual issues to do with granularity and then conclude. Before proceeding further, however, we must start by considering a wider range of data.

2 Loose Talk Regulators & Embedded Contexts

2.1 Loose Talk Regulators

Lasersohn (1999) notes that there are certain expressions whose lexicalised role is to modify the relationship between the literal and communicated content of utterances in which they occur. Call expressions of this type which interact with loose talk **LT-regulators**. LT-regulators can be divided into sub-classes of LT-strengtheners—such as ‘exactly’, ‘completely’, and ‘precisely’, as they occur in $(1_>)$-$(3_>)$—and LT-weakeners—such as ‘roughly’, ‘effectively’ and ‘about’, as they occur in $(1_<)$-$(3_<)$:[5]

[5]‘Exactly’ also has a well-studied use as a modifier combining with numerical determiners. For present purposes, I will set aside interesting questions of the relation between the two uses.

($1_>$) Lena arrived at 9 o'clock exactly.

($2_>$) The fridge is completely empty.

($3_>$) Chicago is precisely 800 miles from New York.

($1_<$) Lena arrived at roughly 9 o'clock.

($2_<$) The fridge is effectively empty.

($3_<$) Chicago is about 800 miles from New York.

The conditions on felicitously assertion of ($1_>$)-($3_>$) are more restrictive than those of (1)-(3). If Lena arrived at 9.02pm, then, while there are contexts at which (1) is assertable, any assertion of ($1_>$) will infelicitous. Furthermore, unlike (1)-(3), the communicated content and literal contents of utterances of ($1_>$)-($3_>$) appear to coincide. An utterance of ($1_>$), for example, communicates that Lena arrived at precisely 9pm.

In contrast to ($1_>$)-($3_>$), ($1_<$)-($3_<$) are felicitously assertable at any context in which (1)-(3) can be asserted. If Lena arrived at 9.02pm, then if (1) can be felicitously asserted, so can ($1_<$). However, unlike (1)-(3), the literal content and communicated content of ($1_<$)-($3_<$) coincide. The literal content of ($1_<$) is true just in case Lena arrived at some time close to 9pm (which is the same as the content it communicates).

As Lasersohn points out, this feature unifies the two kinds of modifier. While LT-strengtheners and LT-weakeners differ in their effect on the conditions for felicitous assertion, they are alike in making the literal and communicated content of the clauses in which they occur coincide. LT-strengtheners do so by assimilating the communicated content to the literal content; LT-weakeners assimilate the literal content to the communicated content.

2.2 Failures of Commutativity

Loose utterances of certain conjunctions with embedded LT-strengtheners exhibit sensitivity to the order of their conjuncts. ($1^{\&}_{\neg}$)-($3^{\&}_{\neg}$) contrast notably with the converse constructions, ($1^{\neg}_{\&}$)-($3^{\neg}_{\&}$):[6]

($1^{\&}_{\neg}$) Lena arrived at 9 o'clock, but she did not arrive at 9 o'clock exactly.

($2^{\&}_{\neg}$) The fridge is empty, but it is not completely empty.

($3^{\&}_{\neg}$) Chicago is 800 miles from New York, though not precisely 800 miles.

[6] The sensitivity to order displayed by conjunction in loose utterance bears a noteworthy resemblance to that observed in Sobel sequences Sobel (1970). Whereas 'If Mary comes, we'll have fun, but if both Mary and John come, we won't' can be uttered felicitously in appropriate contexts, its converse, 'If Mary and John come, we won't have fun, but if Mary comes, we will' is infelicitous in any context.

($1^{\neg}_{\&}$) ?? Lena did not arrive at 9 o'clock exactly, but she arrived at 9 o'clock.

($2^{\neg}_{\&}$) ?? The fridge is not completely empty, but it is empty.

($3^{\neg}_{\&}$) ?? Chicago is not precisely 800 miles from New York, though it is 800 miles from it.

The former, unlike the latter, are felicitously assertable in any context in which in which the left-hand conjunct is false but felicitously assertable. Say that a binary operator $*$ is commutative with respect to property F iff, for all $\gamma, \gamma', *(\gamma)(\gamma')$ instantiates F iff $*(\gamma')(\gamma)$ instantiates F. Generalising from ($1^{\&}_{\neg}$)-($3^{\&}_{\neg}$) and ($1^{\neg}_{\&}$)-($3^{\neg}_{\&}$), we can say that conjunction is non-commutative with respect to felicity for loose utterances.

Conjunction is not the only operator to exhibit failures of commutativity with respect to felicity when used in a loose utterances. While existential quantification is commutative with respect to truth, ($1\exists^{\&}_{\neg}$) and ($1\exists^{\neg}_{\&}$) contrast with respect to felicitous assertability.

($1\exists^{\&}_{\neg}$) Someone who arrived at 9 o'clock didn't arrive at exactly 9 o'clock.

($1\exists^{\neg}_{\&}$) ??Someone who didn't arrive at exactly 9 o'clock arrived at 9 o'clock.

Similarly, turning to inter-sentential effects, the discourses ($1*^{\&}_{\neg}$) and ($1*^{\neg}_{\&}$) contrast:

($1*^{\&}_{\neg}$) a. Lena arrived at 9 o'clock.
b. However, she didn't arrive at 9 o'clock exactly.

($1*^{\neg}_{\&}$) a. Lena didn't arrive at 9 o'clock exactly.
b. ?? However, she arrived at 9 o'clock.

These observations are striking. A characteristic difference between standard static and dynamic treatments of conjunction is that the former, but not the latter, is commutative.[7] Accordingly, ($1^{\&}_{\neg}$)-($3^{\&}_{\neg}$)/($1^{\neg}_{\&}$)-($3^{\neg}_{\&}$) provide *prima facie* grounds for pursuing a theory of loose talk within a dynamic framework.

2.3 Negation & Other Downward Monotonic Environments

Lauer (2016, 389) claims that "loose talk is a phenomenon in which the communicated content is weaker than the semantic content"(i.e., the former is asymmetrically entailed by the latter). However, counter-examples to Lauer's generalisation can be easily identified—in fact, all we need to do is to look at

[7] Indeed, in any system in which update with $\phi \wedge \psi$ is equivalent to consecutive update with ϕ followed by ψ (as proposed in, e.g., Stalnaker (1974) and Heim (1982)), that system is 'strongly static' in the sense of Rothschild and Yalcin (2017) (that is, isomorphic to a system in which every update operation is intersective) only if conjunction is commutative.

the interaction of loose talk with negation. Consider $(1_\neg)$-$(3_\neg)$, as uttered in the same context and circumstances as (1)-(3), respectively.

$(1_\neg)$ Lena didn't arrive at 9 o'clock.

$(2_\neg)$ The fridge isn't empty.

$(3_\neg)$ Chicago isn't 800 miles from NY.

Whereas (1), as uttered in context, is felicitous despite being false, $(1_\neg)$ is infelicitous despite being true. While an utterance of $(1_\neg)$ expresses the literal content that Lena did not arrive at precisely 9pm, it communicates the content that Lena did not arrive at a time close to 9pm.[8] Thus the communicated content of $(1_\neg)$ is strictly stronger than (in the sense of asymmetrically entailing) its literal content.[9]

This contrasts with the behaviour of negated sentences involving LT-strengtheners:

$(1^{\neg}_{>})$ Lena didn't arrive at 9 o'clock exactly.

$(2^{\neg}_{>})$ The fridge isn't completely empty.

$(3^{\neg}_{>})$ Chicago isn't precisely 800 miles from NY.

An utterance of $(1^{\neg}_{>})$ communicates that Lena didn't arrive at 9pm (but is compatible with her arriving at a time close to 9pm). Thus its communicated content is strictly weaker than that of $(1_\neg)$ and coincides with its literal content (and, *a fortiori*, the literal content of $(1_\neg)$).

More generally, when the result of embedding an expression with a loose reading in a downward monotonic environment is uttered, the communicated content of the utterance will, *ceteris paribus*, be stronger than its literal content.[10] Correspondingly, the communicated content will also, *ceteris paribus*, be stronger than the communicated content of an utterance of the same sentence with the relevant expression modified by a LT-strengthener.[11]

[8] Davis (2007, 411) makes the same observation with respect to the communicated content of the sentence 'The coffee is not all gone', noting that in negated sentences, what is implicated assymetrically entails what is said.

[9] Note that the communicated content of certain loose utterances will be neither stronger nor weaker than their literal content. For example, 'Half of the guests did not arrive at 9 o'clock' has a reading on which it communicates that roughly half the guests did not arrive at roughly 9 o'clock.

[10] Why *ceteris paribus*? There are two reasons for the qualification: first, it is possible that other expressions in upward monotonic environments may have also have a loose reading, in which case the communicated content of the assertion will be neither stronger nor weaker than its literal content; second, certain expressions with a loose communicated content which is stronger than their literal content in upward monotonic environments exhibit the opposite behavior in downward monotonic environments (see fn.26).

[11] Say that an n-ary operator $*$ is downward monotone on its ith argument (relative to a specified entailment relation $\models$) iff, if $\gamma \models \gamma'$, then $*(\gamma_1)\dots(\gamma_{i-1})(\gamma')(\gamma_{i+1})\dots(\gamma_n) \models *(\gamma_1)\dots(\gamma_{i-1})(\gamma)(\gamma_{i+1})\dots(\gamma_n)$.

($1_{\forall}$) Everyone who arrived at 9 o'clock saw the fireworks.

($1^{>}_{\forall}$) Everyone who arrived at 9 o'clock exactly saw the fireworks.

The universal quantifier is downward monotone in its restrictor. In the context and circumstances from above, the communicated content of ($1_{\forall}$) will be stronger than both: (i.) its own literal content and (ii.) the communicated content of ($1^{>}_{\forall}$). A speaker who asserts ($1_{\forall}$), but not one who asserts ($1^{>}_{\forall}$), is committed to Lena having seen the fireworks if she arrived at a time close to, but not identical with, 9pm.[12]

3 Pragmatic Halos

Lasersohn (1999) proposes a systematic treatment of loose talk. The resulting account constitutes by far the most extensive current treatment of the phenomenon. On Lasersohn's theory, every expression in a language is associated with a set of objects of the same logical type as its denotation—what he terms a **pragmatic halo**. The pragmatic halo of an atomic expression comprises objects differing from its denotation "only in ways which are pragmatically ignorable in context"(526). For example, at a context at which (1) can be used to communicate that Lena arrived between 8.55pm and 9.05pm, the pragmatic halo of '9 o'clock' would be the interval [8.55pm, 9.05pm]. The pragmatic halo of a complex expressions is then derived compositionally as a function of the pragmatic halos of its constituents. For example, where 'arrived at 9 o'clock' is a complex VP with daughters 'at 9 o'clock' and 'arrived', its pragmatic halo will be the set obtained via pointwise combination of elements of the pragmatic halo of the former with the elements of the pragmatic halo of the latter.

Lasersohn provides a semi-formal implementation of his informal notion of a pragmatic halo. For any expression γ and context σ, let $\mathrm{H}_\sigma(\gamma)$ be some set such that:

Def. A. i. $[\![\gamma]\!] \in H_\sigma(\gamma)$.
ii. if $x \in H_\sigma(\gamma)$, then x has type τ iff $[\![\gamma]\!]$ has type τ.

Intuitively, $\mathrm{H}_\sigma(\gamma)$ is the pragmatic halo of γ at σ. Where ζ is a syntactic operation defined on expressions $\gamma_i \ldots \gamma_j$ (such that $\gamma_i \ldots \gamma_j$ are not LT-regulators) and θ is the corresponding semantic operation defined on $[\![\gamma_i]\!] \ldots [\![\gamma_j]\!]$, the pragmatic halo of $\zeta(\gamma_i \ldots \gamma_j)$ is determined in accordance with **Def. B**:

Def. B. $\mathrm{H}_\sigma\zeta(\gamma_i, \ldots, \gamma_j) = \{\theta(x_i, \ldots, x_j) \mid x_i \in \mathrm{H}_\sigma(\gamma_i), \ldots, x_j \in \mathrm{H}_\sigma(\gamma_j)\}$.

[12]Note that the opposite effect occurs in upward monotonic environments.

($1'_{\forall}$) Everyone who saw the fireworks arrived at 9 o'clock.

($1'_{\forall}$) has a communicated content weaker than its literal content.

That is, the pragmatic halo of $\zeta(\gamma_i, \ldots, \gamma_j)$ is determined by pointwise combination of the elements of the pragmatic halos of its constituents. For example, where γ is a complex expression with daughters β, α which combine by function application (such that $[\![\gamma]\!] = [\![\beta]\!]([\![\alpha]\!])$) and β, α are not LT-regulators, $\mathrm{H}_\sigma(\gamma) = \{y(z) \mid y \in \mathrm{H}_\sigma(\beta),\ z \in \mathrm{H}_\sigma(\alpha)\}$.

However, where γ is a complex expression with an LT-strengthener as a daughter, a distinct principle is introduced to determine $\mathrm{H}_\sigma(\gamma)$. Lasersohn takes every LT-strengthener to denote an identity function (of some appropriate logical type). Thus, for example, if 'exactly' combines with expressions of type τ, then $[\![\text{exactly}]\!]=(\lambda X_\tau . X_\tau)$. Correspondingly, $\mathrm{H}_\sigma(\text{exactly})$ is the set of functions which 'approximate' (in some sense) the identity function $(\lambda X_\tau . X_\tau)$. However, the pragmatic halo of a complex expression with 'exactly' as a daughter is determined, not by **Def. B**, but by **Def. C**:

Def. C. $\mathrm{H}_\sigma(\text{exactly } \gamma) = \{f([\![\gamma]\!]) \mid f \in H_\sigma(\text{exactly})\}$.[13]

That is, the pragmatic halo of ⌜exactly γ⌝consists of the result of applying elements of the halo of 'exactly' (i.e., functions which 'approximate' the identity function denoted by 'exactly') to $[\![\gamma]\!]$. On the assumption that the pointwise application of functions approximating the identity function to $[\![\gamma]\!]$ determines a proper subset of $\mathrm{H}_\sigma(\gamma)$, the effect of 'exactly' is to reduce the size of the pragmatic halo of γ. Note that since $\mathrm{H}_\sigma(\text{exactly})$ contains functions approximating the identity function, $\mathrm{H}_\sigma(\text{exactly } \gamma) \neq \{[\![\gamma]\!]\}$. This feature of the system is intended to reflect the apparent acceptability of an utterance of, e.g., $(1_>)$ in a context of evaluation in which Lena arrived just a few seconds after 9pm.

In response to *Q.2*, Lasersohn proposes that an utterance of a (declarative) sentence ϕ, produced with assertoric force, is felicitous at a context σ and world w just in case there is some $p \in H_\sigma(\phi)$ such that p is true at w. Thus, for example, if $\mathrm{H}_\sigma((1))=\{(\lambda w.\ \mathsf{Arrived}(\mathsf{Lena},t,w)) \mid t \in [8.55\text{pm}, 9.05\text{pm}]\}$, then (1) is predicated to be felicitously utterable iff Lena arrived within 5 minutes of 9pm.

Lasersohn doesn't explicitly offer a response to *Q.1*, failing to address how the communicated content of loose utterances is derived within his framework. However, it is natural to suppose that an assertoric utterance of a sentence γ at a context σ will communicate the proposition true iff γ is felicitously utterable at σ. That is, it will have the communicated content $\bigcup \mathrm{H}_\sigma(\gamma)$, the n-ary union of the propositions in its pragmatic halo. Thus if $\mathrm{H}_\sigma((1))=\{(\lambda w.\ \mathsf{Arrived}(\mathsf{Lena},t,w)) \mid t \in [8.55\text{pm}, 9.05\text{pm}]\}$, then an utterance of (1) communicates the proposition $(\lambda w.\ \exists t \in [8.55\text{pm}, 9.05\text{pm}]\text{: } \mathsf{Arrived}(\mathsf{Lena},t,w))$. That is, the proposition that Lena arrived within 5 minutes of 9pm.

While Lasersohn's framework is designed to account for the effect of LT-strengtheners, it struggles to accommodate many of the other features of loose talk identified in §2.

[13] Lasersohn alternatively defines H_σ (exactly γ) via appeal to a centred ordering on $\mathrm{H}_\sigma(\gamma)$. As he notes (549,fn21), the two formulations are equivalent.

First, note that on the proposed treatment of communicated content, it follows from Lasersohn's theory that the communicated content of a loose utterance is always weaker than its literal content. An utterance of ϕ is loose iff $\mathrm{H}_\sigma(\phi)$ has more than one member. In this case, $[\![\phi]\!] \subset \bigcup \mathrm{H}_\sigma(\phi)$. As a result, Lasersohn will fail to explain the interaction of loose talk with downward monotonic environments.

For example, assume for simplicity that negation is assigned a trivial halo (i.e., $\mathrm{H}_\sigma(\text{not})=\{[\![\text{not}]\!]\}$). The halo of $(1_\neg)$ will, by **Def. B**, compose by pointwise application of negation to the members of the halo of (1). That is, $\mathrm{H}_\sigma((1_\neg))=\{\neg p \mid p \in H_\sigma((1))\}$. $(1_\neg)$ is therefore incorrectly predicted to communicate the proposition true iff there is some time around 9 o'clock at which Lena did not arrive. Similarly, an utterance of $(1_\neg)$ is predicted to be felicitous as long as some proposition in its halo is true. Yet this condition is satisfied as long as there is some time sufficiently close to 9 o'clock at which Lena did not arrive. Thus, according to Lasersohn, $(1_\neg)$ could be felicitously uttered even if Lena in fact arrived at precisely 9pm.[14, 15]

Second, in Lasersohn's system 'exactly' has a purely local effect; it restricts only the halo of its complement. As such, Lasersohn is unable to accommodate the effect of order on the felicity of conjunctions involving LT-strengtheners. Given the way in which pragmatic halos are derived, if $*$ is a commutative operator with a trivial pragmatic halo, then $\mathrm{H}_\sigma(*(\gamma)(\gamma')) = \mathrm{H}_\sigma(*(\gamma')(\gamma))$. Since, presumably, the halo of 'and' is trivial (i.e., $\mathrm{H}_\sigma(\text{and})=[\![\text{and}]\!]$), the felicity conditions of $(1^{\&}_{\neg})$ and $(1^{\neg}_{\&})$ are predicted to coincide.

Finally, Lasersohn himself notes that his theory implies that loose utterances of contradictions can sometimes be acceptable (Lasersohn, 1999, 531). In an appropriate context, $(1_\perp)$-$(3_\perp)$ are all predicted to be felicitous. The halo of $(1_\perp)$ will include a consistent propositition as long as the halo of $(1_\perp.\text{a})$ includes a proposition true if Lena arrived after 9.02pm (since any such proposition can be consistently conjoined with the literal content of $(1_\perp.\text{b})$ (which is, trivially, a member of the latter's halo)). In contexts in which its halo includes a consistent proposition, Lasersohn predicts $(1_\perp)$ will be felicitous to utter if Lena arrived after 9.02pm. The same argument applies, *mutatis mutandis* to $(2_\perp)$-$(3_\perp)$.

Yet $(1_\perp)$-$(3_\perp)$ are infelicitous in any context. Lasersohn attempts to explain this by claiming that, in any context in which, e.g, $(1_\perp.\text{a})$ can be felicitously asserted, the standards of exactness in the conversation must be such as to make the utterance of $(1_\perp.\text{b})$ irrelevant. However, this strategy over-generates. Analogous reasoning would predict the infelicity of $(1^{\&}_{\neg})$. In any context in which the left-hand conjunct is assertable, the observation that Lena did not arrive at 9 o'clock exactly ought to be pragmatically irrelevant. But, as observed above,

[14] A similar problem arises for Yablo (2014)'s account of loose talk as truth-with-respect to a subject matter.

[15] This failing of Lasersohn is noted in Hoek (2018). Hoek's theory of conversational exculpature, applied to loose talk, systematically predicts the behaviour in downward monotonic environments (though it does not, without amendment, extend to order effects).

($1^{\&}_{\neg}$) is perfectly felicitous.

An alternative strategy (within the same framework) is proposed by Lauer (2016), but suffers from a parallel issue. Lauer proposes that in performing an utterance a speaker undertakes a commitment to act as if that utterance is literally true. Agents who follow an assertion of ($1_{\bot}$.a) with ($1_{\bot}$.b) obviously violate this commitment. Hence, ($1_{\bot}$) is predicted to be marked. Yet, like Lasersohn, Lauer's explanation also predicts the infelicity of ($1^{\&}_{\neg}$). Acting as if the left-hand conjunct of ($1^{\&}_{\neg}$) is true is incompatible with asserting the right-hand conjunct. A different approach appears necessary to explain the unavailability of acceptable loose uses of contradictions.

On the pragmatic halo based account, the literal and communicated content of a loose utterance of a sentence differ; when a sentence is uttered with a loose reading, the content it communicates differs from its truth conditions. However, it is possible for the communicated and literal content of an utterance to differ, yet for the former to be fully determined by the latter. Conversational implicatures provide a paradigmatic example, on a Gricean or Neo-Gricean account. The next two sections focus on this issue. It is argued, first, that the meaning of loose utterances cannot be a function of its truth conditions and context, and, second, that the meaning of a loose talk utterance which outstrips its truth conditions is conventionally encoded.

4 Layers of Meaning

($1^{\&}_{\neg}$) and ($1^{\neg}_{\&}$) agree in their truth conditions. After all, they differ only in the order of their conjuncts, and conjunction commutes with respect to truth. The same holds of ($1\exists^{\&}_{\neg}$) and ($1\exists^{\neg}_{\&}$) under the standard assumption that existential quantification is likewise commutative with respect to truth. Yet ($1^{\&}_{\neg}$) and ($1^{\neg}_{\&}$) differ in felicitous assertability (and, likewise, ($1\exists^{\&}_{\neg}$) and ($1\exists^{\neg}_{\&}$)). This difference appears hard to explain if (i.) the meaning of an utterance is determined by the truth conditions of the sentence uttered in context (even if the utterance's meaning goes beyond the truth conditions of the uttered sentence), and (ii.) the felicity of an utterance is determined by its meaning.

Similarly, (1) and ($1_{>}$) agree in their truth conditions (or, at least, so I have argued). Yet discourses ($1_{\dagger}$) and ($1^{>}_{\dagger}$) differ in their felicitous assertability.

($1_{\dagger}$) Lena arrived at 9 o'clock. More precisely, she arrived at 9.02pm.

($1^{>}_{\dagger}$) Lena arrived at 9 o'clock exactly. ??More precisely, she arrived at 9.02pm.

The two discourses diverge only with respect to their first sentences. So, this difference in felicity is hard to explain if (i.) the meaning of an utterance is determined by the truth conditions of the sentence uttered and (ii.) the effect of an utterance on the context at which later utterances are evaluated is determined by its meaning.

At this point, it is helpful to look at an analogous case. Consider (4_1) and (4_9) (originally due to Partee, attributed in Heim (1982)). As Heim notes, (4_1.a) and (4_9.a) agree in their truth conditions. Nevertheless, the two discourses differ in felicity:

(1_1) a. I dropped some marbles and found all of them except one.
b. It's probably under the sofa.

(4_9) a. I dropped some marbles and found only nine of them.
b. ?? It's probably under the sofa.

The anaphoric use of the pronoun in (4_1.b)/(4_9.b) is acceptable in the former discourse but not the latter. To account for this difference, Heim suggests, we need to entertain a layer of meaning which outstrips the truth conditions of the two sentences and which will account for the difference in anaphoric potential. Note that nothing claimed thus far establishes whether the level of meaning at which they differ should be classified as semantic or pragmatic.[16]

Consider another case. Where $_\mathrm{F}$ marks focus on a constituent (phonologically realized as a pitch accent), (5) and ($5'$) intuitively have the same truth conditions. Yet the truth conditions of (5_O) and ($5'_\mathrm{O}$) differ. The latter, but not the former, entails that Mark did not introduce more than one person to Joe.

(5) Mark introduced Sarah to $[\text{Joe}]_\mathrm{F}$.

($5'$) Mark introduced $[\text{Sarah}]_\mathrm{F}$ to Joe.

(5_O) Mark only introduced Sarah to $[\text{Joe}]_\mathrm{F}$.

($5'_\mathrm{O}$) Mark only introduced $[\text{Sarah}]_\mathrm{F}$ to Joe.

The truth conditions of a sentence are determined by the meaning of its parts. Yet the parts of (5)-($5'$) do not differ in their contribution to the sentences' respective truth conditions. Hence, if we are to account for the difference in truth conditions between (5_O)-($5'_\mathrm{O}$), we must posit that (5)-($5'$) (or, at least, their parts) differ in meaning at a level which outstrips their truth conditions (see, e.g., Rooth (1985, 1992, 1996), Krifka (1991)).[17]

A corresponding move is required in the case of loose talk. If we are to account for order effects despite the sameness of truth conditions, we will need to posit that the meaning of a loose utterance is not fully determined by its truth conditions.

[16] Heim goes on to assimilate the behavior of indefinites exemplified in (4_1)-(4_9) to that involved in donkey anaphora, arguing on that basis that the file change potential of a sentence is part of its semantically determined meaning.

[17] Other paradigmatic examples of meaning which outstrips an utterance's truth condition include both conversational implicature (Grice (1967)) and conventional implicature (Grice (1967), Potts (2004, 2005, 2007)).

5 Semantics vs. Pragmatics

We can categorize meaning on the basis of whether it is semantically or pragmatically encoded. Having posited a layer of meaning outstripping truth conditions in order to explain loose talk phenomena, we next need to consider which side of this distinction it should be located on. Rather than commit to any particular account of how the distinction should be drawn (if, indeed, it should be drawn at all) for present purposes I intend to focus instead on core properties which are widely taken to characterise semantic and pragmatic meaning. In order, we will consider the properties of conventionality, compositionality and embeddability.[18] In each case, it is argued that the layer of meaning determining loose talk phenomena exhibits features which are characteristically semantic.

i. Conventionality.
Semantic meaning is conventional: atomic expressions of a language have their semantic meaning in virtue of the conventions which hold amongst the speakers of that language. Pragmatic meaning, in contrast, is non-conventional: the conventions which hold amongst speakers of a language are insufficient to determine the pragmatic meaning associated with any particular use of an expression (though they may well be necessary).

Grice (1967) formulates Non-Detachability as a constraint relating the conventional and non-conventional meaning of an utterance.

Non-Detachability:

> Two utterances in the same context differ with respect to non-conventional meaning only if they differ with respect to conventional meaning.

That is, if two utterances have the same conventional meaning, then they cannot be associated with different non-conventional meanings in the same context. Grice motivates Non-Detachability in part by appeal to calculability of non-conventional meaning. It should be possible, he claims, for interlocutors to

[18] Recently, some (e.g., Michaelson (2016), Stainton (2016), Borg (2017)) have proposed a additional criterion for semantic content. According to these authors, a speaker who intends to deceive her audience regarding p by asserting ϕ lies only if p is (a consequence of) the semantic content of ϕ. Thus, they claim, if a speaker can assert ϕ with the intent to deceive hearers regarding p without that assertion constituting a lie, then p is not (a consequence of) the semantic content of ϕ. Crucially, however, many types of not-at-issue semantic content fail to satisfy this criterion. For example, it is a entailment of the not-at-issue semantic content of (‡) that the speaker's opponent previously received donations from the mafia. Yet a speaker may assert (‡) with the intent to deceive her audience about her opponent's connections to organized crime without thereby lying.

(‡) My opponent no longer receives campaign donations from the mafia.

As such, the judgments about lying provide, at most, a test for what is entailed by the *at-issue* semantic content of a sentence. Insofar as the category in which we are interested is not restricted to at-issue content, the criterion is insufficiently general. I am grateful to an anonymous referee at *Noûs* for pointing out the connection of this literature to the discussion in §5 .

calculate the non-conventional meaning of an utterance on the basis of knowledge of its conventional meaning and the conversational context alone.

An explanation which aims to account for loose talk phenomena as features of the non-conventional meaning of an utterance is incompatible with Non-Detachability.

(1) Lena arrived at 9 o'clock.

($1_>$) Lena arrived at 9 o'clock exactly.

($1^{\neg}_>$) (But) she didn't arrive at 9 o'clock exactly.

As noted above, (1) and ($1_>$) have different effects on discourse. (1), but not ($1_>$), can be felicitously followed by an utterance of ($1^{\neg}_>$). Assuming that the effect of an utterance on discourse is determined by its meaning, by Non-Detachability, there must be some difference in the conventional meanings of (1) and ($1_>$). Yet they agree in truth conditions. Hence, to explain their divergent effects on discourse, (1) and ($1_>$) must exhibit a difference in conventional meaning which outstrips their truth conditions.

This result is unsurprising. §4 appealed to minimal pairs such as (1)/($1_>$) to argue that loose talk phenomena can vary independently of truth conditional meaning. Hence, any account of those phenomena compatible with Non-Detachability must posit some difference in conventional meaning across such pairs.

Grice does not accept Non-Detachability in its full generality. Violations of the principle are permitted in cases where the derivation of non-conventional meaning involves appeal to the maxim of manner (1967, 58). The maxim of manner allows for the calculation of implicatures on the basis of features of an utterance which outstrip its conventional meaning, such as the ease with which it can be processed, the cost of its production, etc..

Accordingly, it would be in principle possible to offer a Gricean or neo-Gricean account of the difference in meaning between (1) and ($1_>$) by appealing to the maxim of manner (cf., in particular, Leech (1983, 99), and Horn (1984)'s R-based implicatures). However, the details of such an account remain unclear. In particular, the maxim of manner is notoriously unconstrained. Any feature of the utterance can, in principle, contribute to the calculation of an implicature via manner. It would, thus, be especially surprising if any account of this kind were able to predict the systematic patterns in loose talk phenomena which were observed in §2.

ii. Compositionality.
Semantic meaning is typically assumed to be compositional. Stated programmatically, the semantic meaning of a complex expression is determined by the semantic meaning of its parts and the way they are combined. In contrast, pragmatic meaning is assumed to be non-compositional. It is neither sufficient (nor necessary) for the calculation of the pragmatic meaning of an expression that one know the pragmatic meaning of its parts.

The effect of a loose utterance on discourse is sensitive to the complement taken by LT-regulators.

(1_{12}) Lena arrived at 9 o'clock exactly with a dozen friends.

($1'_{12}$) Lena arrived at 9 o'clock with exactly a dozen friends.

($1^{\neg}_{>}$) (But) she didn't arrive at 9 o'clock exactly.

(1_{12}) and ($1'_{12}$) have divergent effects on discourse. The latter, but not the former, can be felicitously followed by an utterance of ($1^{\neg}_{>}$). Thus, on the assumption that the discourse effects of an utterance are determined by its meaning, (1_{12}) and ($1'_{12}$) must differ in meaning.

Yet (1_{12}) and ($1'_{12}$) differ syntactically only in the sub-clausal phrase with which 'exactly' combines. Any minimally systematic account should attribute their difference in discourse effects to this difference in the complement taken by 'exactly'. That is, the divergent contribution of the LT-regulator to the effects of the two sentences must be determined compositionally, as a function of the difference in the phrase with which it combines in each. If it is characteristic of the difference between semantic and pragmatic meaning that only the former is determined compositionally, then the difference in meaning between (1_{12}) and ($1'_{12}$) must be a difference in semantic meaning. Furthermore, since the truth conditions of the two are the same, their semantic meaning must outstrip their truth conditional meaning.

It may be helpful to compare the situation here to the case involving focus. As noted above, (5_O) and ($5'_O$) differ in meaning.

(5_O) Mark only introduced Sarah to [JOE]$_F$.

($5'_O$) Mark only introduced [SARAH]$_F$ to Joe.

Yet (5_O) and ($5'_O$) differ only in the placement of focus. On any minimally systematic account, the difference in meaning should be attributed to difference in the focused element across the two sentences. It is for this reason that the placement of focus is standardly taken to contribute to the compositionally determined conventional meaning of an expression. Furthermore, since, absent focus sensitive operators, two sentences differing only in the placement of focus will agree in truth conditions, the contribution of focus is assumed to outstrip the truth conditional meaning of a sentence.

More generally, where the meaning of a sentence is sensitive to the sub-clausal complement taken by some expression (e.g., an LT-regulator or focus), this is *prima facie* evidence that the relevant layer of meaning is compositionally determined. Where the truth conditions of the sentence are insensitive to the placement of that expression, this is then evidence that the semantic meaning of the sentence outstrips its truth conditions.

iii. Embeddability.

Pragmatic meaning is typically assumed to be exhibited only by unembedded expressions. If a token of γ is a proper constituent of a token of γ', then that token of γ cannot be employed to perform a speech act. Accordingly, if tokens of expressions acquire pragmatic meaning only in virtue of being employed to perform speech acts, then the proper constituents of a complex expression will not exhibit pragmatic meaning. In contrast, proper constituents of complex expressions do possess semantic meaning (indeed, according to compositionality, the semantic meaning of a complex expression is determined by the semantic meanings of its proper constituents and their mode of combination).

The communicated content of clauses which support a loose reading appears to embed under certain truth conditional operators.

($1_{\to}$) If Lena arrived at 9 o'clock, she saw the fireworks.

($1^{<}_{\to}$) If Lena arrived at roughly 9 o'clock, she saw the fireworks.

($1_{\forall}$) Everyone who arrived at 9 o'clock saw the fireworks.

($1^{<}_{\forall}$) Everyone who arrive at roughly 9 o'clock saw the fireworks.

The content communicated by an utterance of ($1_{\to}$) coincides with the result of applying truth conditional meaning of the conditional to the communicated content of the antecedent (i.e., (1)). To see this more carefully, observe that, as noted above, the communicated content of (1) coincides with the literal content of ($1_{<}$). Yet the communicated content of ($1_{\to}$) coincides with the literal content of ($1^{<}_{\to}$). So, the communicated content of ($1_{\to}$) is the same as the content obtained by applying the conditional to the content communicated by its antecedent. Similarly, the content communicated by ($1_{\forall}$) is the same as the literal content expressed by ($1^{<}_{\forall}$).

In both cases, this suggests that the communicated content of the sentence can be obtained by applying the truth conditional meaning of the operator to the communicated content of the embedded clause. Yet, were communicated content determined by a pragmatic layer of meaning, it would be expected to be calculable only at sentence level. Hence, where the meaning of a complex expression can be calculated by applying the truth conditional meaning of an operator to some level of the meaning of a constituent clause, this is *prima facie* evidence that the relevant level of meaning associated with the clause is semantically encoded.

Again, it may be helpful to consider an analogous case. (6) permits a scalar interpretation on which it implies Manuel did not answer question 1 *and* question 2.

(6) Manuel answered question 1 or question 2.

However, the scalar interpretation associated with disjunction been noted to embed in certain environments. ($6_{\to}$.a) permits a reading on which it expresses the claim that answering one, but not both of question 1 and 2 is incompatible with receiving a grade higher than B^+. Indeed, this is the only reading on which it is compatible with ($6_{\rightarrow}$.b). The same observation goes for the embeddability of the scalar interpretation under universal quantification in ($6_{\forall}$.a-b).

($6_{\rightarrow}$)
a. If you answer question 1 or question 2, you can receive at most a B^+.
b. If you answer both, you can receive an A.

($6_{\forall}$)
a. Everyone who answered question 1 or question 2 received at most a B^+.
b. Everyone who answered both received an A.

On this basis, it has been argued that the scalar interpretation of an expression must be part of its conventionally encoded, semantic meaning (see, e.g., Chierchia (2004), Chierchia et al. (2012), Sauerland (2004, 2012), though cf. Geurts (2009)). Regardless of whether this treatment of scalar interpretations is ultimately correct, the embeddability of a layer of content in complex sentences poses an apparent problem for the claim that the layer of content is determined pragmatically.

In the final sections of the paper, I develop a framework for theorizing about loose talk. It is shown how this framework can account for the phenomena in §2 in a systematic manner. The communicated content and discourse effects of loose utterances, it is proposed, arise from a lexically encoded level of meaning which deviates from—and is not determinable in terms of—the truth conditions of the sentence uttered. §6 offers an informal overview of the framework; §7 develops a formal implementation for a simple language with monadic predicates; §8 discusses residual issues to with levels of granularity; §9 concludes.

6 A Dynamic Theory of Loose Talk

6.1 Pragmatic Equivalence

In any conversation certain differences between ways the world could be will be irrelevant, given the aims of the participants. For example, suppose that Pyotr drove 796 miles to Chicago in 12 hours and 15 minutes, leaving New York at 8am. If what we are interested in is the time at which he arrived, then the difference between driving 796 and 800 miles will not be relevant. However, the difference between driving for 12 hours and 15 minutes and only driving for 12 hours will. In contrast, if what we are interested in is the number of miles added to Pyotr's mileometer, then the difference between driving 796 and 800 miles will be relevant, whereas the difference between doing it in 12 hours and 15 minutes and only driving for 12 hours will not.[19]

The first, unsophisticated observation underlying the treatment of loose talk defended below is that the felicity of a loose utterance is sensitive to what differences are relevant in a conversation. In a discourse aimed at resolving the first issue with a relatively high degree of accuracy, it would be felicitous to assert 'Pyotr drove 800 miles', but not 'Pyotr arrived at 8pm'. In contrast, in a discourse aimed at resolving the second issue with a relatively high degree of accuracy an assertion of the latter, but not the former, would be felicitous (cf. Klecha (2018, §2.1)).

The second observation is that certain assertions (in particular, those which involve LT-strengtheners) can affect which differences are relevant in a context. After asserting 'Pyotr drove exactly 796 miles', it would no longer be acceptable to assert that he drove 800 miles. Plausibly, this is because in the wake of the first assertion, the difference between driving 796 and 800 miles is made relevant (note that an assertion of the unmodified 'Pyotr drove 796 miles' would also have this effect. This is discussed in detail in §8.).

Before presenting a formal implementation of the theory of loose talk for a simplified language, we can sketch how the informal theory would apply to assertions of sentences in a more sophisticated, natural language.

Say that two worlds are pragmatically equivalent at a context σ iff they do not differ in ways which are relevant given the aims of the discourse in σ. The relation of pragmatic equivalence can be modeled as a family of accessibility relations, $\mathcal{R}_\sigma, \mathcal{R}_{\sigma'}, \ldots$, indexed to contexts:

$$\mathcal{R}_\sigma = \{\langle w, w' \rangle \mid w' \text{ is pragmatically equivalent to } w \text{ in } \sigma\}.$$

This family of relations can be expected to have certain properties. For any σ, $\mathcal{R}_\sigma$ should be reflexive. No world differs from itself in ways which are pragmatically relevant. Similarly, for any σ, $\mathcal{R}_\sigma$ should be symmetric. If w does not differ from w' in any way which is pragmatically relevant, then w' does not differ from w in any way which is pragmatically relevant. However, for at least some contexts σ, $\mathcal{R}_\sigma$ will be non-transitive. Irrelevant differences between w and w' and between w' and w'' can add up to a relevant difference between w and w''.

For the purposes at hand, we can model a context as a pair, consisting of an information state (representing what possibilities are under consideration at the context) and an accessibility relation (representing what differences are irrelevant at the context).

[19] Some differences will presumably be relevant in any discourse, regardless of its aims. For example, there is no context in which it is pragmatically acceptable to ignore the difference between New York closer to the Atlantic than Chicago and Chicago being closer to the Atlantic than New York. Regardless of the context, a speaker who made the latter claim would be acting infelicitously.

6.2 Overview

The central idea of the theory developed below is that every loose use of a declarative sentence with assertoric force performs a dual role:

(i.) It expresses a proposition, corresponding to its literal content; and,

(ii.) It modifies the conversational context.

In line with the argument in §4, the latter feature of an assertion will not be determinable from the former.

These two effects will be modeled using two distinct interpretation functions. A static interpretation function, $[\![\cdot]\!]$, maps each sentence to a **proposition**—a function from worlds to truth values. $[\![\phi]\!]$ is the proposition corresponding to the literal content of ϕ. We say that a context **incorporates** ϕ if its information state is a subset of $[\![\phi]\!]$. It **excludes** ϕ if its information state is disjoint from $[\![\phi]\!]$. A dynamic interpretation function, $[\cdot]$, maps each sentence to a **context change potential** (CCP)—a function from one context to another. $\sigma[\phi]$ is the result of applying $[\phi]$ to σ. We say that a context **accepts** ϕ if update with ϕ leaves its information state unchanged. It **rejects** ϕ if update with ϕ returns an empty information state. We assume that it is felicitous to assert ϕ at a context as long as ϕ is not rejected there.

Where ϕ receives a loose reading in context, updating a context with ϕ amounts to more than simply intersecting the information state of the context with $[\![\phi]\!]$. Rather, which worlds in the information state survive update with ϕ also depends on the relation of pragmatic equivalence at the context.

An utterance of a simple sentence—such as (1)—serves to rule out that the world is relevantly different from one in which Lena arrived at 9 o'clock. To model this, the information state of the new context will be that subset of the old information state including only those worlds which are $\mathcal{R}_\sigma$-related to a world at which Lena arrived at 9pm. (1) is accepted at a context iff, for each world in the information state, the difference between Lena arriving at 9pm and arriving at the time she arrived in that world is not relevant in the context.

An utterance of a sentence modified by an LT-strengthener—such as ($1_>$)—differs from an utterance of a simple sentence in that it changes which differences are relevant in context. To model this, we take LT-stengtheners to induce updates on both the information state and relation of pragmatic equivalence at a context. For example, an utterance of ($1_>$) first updates the relation of pragmatic equivalence so that any difference in who arrived at 9pm is relevant.[20] It then rules out those worlds in the information state which are not related to a world at which Lena

[20] In a fully developed theory of loose talk for natural language, we might want the output of an update with ($1_>$) to relate two worlds only if they agree on the time of everybody's arrival. This could be achieved by taking two worlds to be related by the restricted relation if they agree in the extension of $(\lambda t \lambda x \lambda w.\mathsf{Arrived}(x, t, w))$, rather than the extension of $(\lambda x \lambda w.\mathsf{Arrived}(x, \mathsf{9pm}, w))$.

arrived at 9pm by the new accessibility relation. As a result, ($1_>$) is accepted at a context iff that context incorporates its literal content.

Finally, an utterance of a negated sentence rules out all and only those worlds which survive update with the clause under negation. For example, the information state of $\sigma[(1_\neg)]$ is the information state of σ, minus the information state of $\sigma[(1)]$. As discussed in §2.3, the effect of LT-regulators on what differences count as relevant in a context projects out of negation. Thus, a negated sentence has the same effect on the relation of pragmatic equivalence as its negated clause does.

The communicated content of an assertion can then be derived directly from its effect on context. A loose utterance of ϕ in context communicates the proposition true at all those worlds which survive update of the minimally informed context with ϕ. The communicated content of (1) is predicted to be equivalent to the proposition that there is a pragmatically equivalent world in which Lena arrived at 9pm. In contrast, the communicated content of ($1_\neg$) is predicted to be equivalent to the proposition that there is no pragmatically equivalent world at which Lena arrived at 9pm.

In the following section, the picture of loose talk sketched here is filled-in formally for a simple language with monadic predicates, LT-regulators, negation and conjunction; Appendix A extends the language to include generalized quantifiers. The resulting framework is not intended as a full, working theory of loose talk in natural language. Instead, it serves two primary functions: (i.) to demonstrate how the informal theory presented in this section can be developed in concrete terms for a simplified language; and (ii.) to illuminate how the informal theory of loose talk provided here predicts failures of commutativity, the infelicity of contradictions and the interaction of loose talk with downward monotonic environments.

7 The Logic of Loose Talk

7.1 Background

Let Con be a set of constants. Let Pred be a set of monadic predicates. $\alpha, \alpha', \ldots$ and $\beta, \beta', \ldots$ are schematic variables over Con and Pred, respectively. $\mathcal{L}_{LT}$ includes negation and conjunction operators, as well as predicate modifiers '*Exactly*' and '*Roughly*'.

Def. 1. $\mathcal{L}_{LT} ::= \beta(\alpha) \mid \mathit{Exactly}(\beta)(\alpha) \mid \mathit{Roughly}(\beta)(\alpha) \mid \neg\phi \mid \phi \wedge \psi.$

A model for $\mathcal{L}_{LT}$ is a tuple consisting of a non-empty domain of individuals, $\mathcal{D}$; a non-empty domain of worlds, $\mathcal{W}$, (where $\mathcal{W}$=Pred$\rightarrow\mathcal{P}(\mathcal{D})$); a reflexive, symmetric relation, $\mathfrak{R} \subseteq \mathcal{P}(\mathcal{W} \times \mathcal{W})$; and a pair of interpretation functions: $[\![\cdot]\!]$, and $[\cdot]$. We refer to $\mathfrak{R}$ as the maximal relation of the model. We refer to $[\![\cdot]\!]$ and

$[\cdot]$ as the static and dynamic interpretation functions, respectively:

> **Def. 2.** A model $\mathcal{M}$ is a tuple s.t.: $\mathcal{M} = \langle \mathcal{D},\ \mathcal{W},\ \mathfrak{R},\ [\![\cdot]\!],\ [\cdot] \rangle$.

Information states $c, c' \ldots$ are subsets of $\mathcal{W}$. **Accessibility relations** $\mathcal{R}, \mathcal{R}', \ldots$ are reflexive and symmetric subsets of $\mathfrak{R}$. We adopt the notation $\mathcal{R}(w) = \{w' \mid \langle w, w' \rangle \in \mathcal{R}\}$; that is, $\mathcal{R}(w)$ is the set of worlds $\mathcal{R}$-accessible from w (and, likewise for $\mathfrak{R}(w)$). A **context** $\sigma \in \Sigma$ is a pair $\langle c_\sigma, \mathcal{R}_\sigma \rangle$ comprised of an information state and accessibility relation. Intuitively, for any context σ, c_σ represents the possibilities under consideration in σ; $\mathcal{R}_\sigma$ represents the relation of pragmatic equivalence in σ. For any σ, if $c_\sigma = \emptyset$, we say that σ is an **absurd context**.

> **Def. 3.** Let $\mathbf{R} \subseteq \mathcal{P}(\mathfrak{R})$ s.t. $\mathcal{R} \subseteq \mathfrak{R}$ is an element of $\mathbf{R}$ iff for all $w, w' \in \mathcal{W}$:
> i. $w \in \mathcal{R}(w)$, and
> ii. if $w' \in \mathcal{R}(w)$, then $w \in \mathcal{R}(w')$.
> Then, where Σ is the set of contexts, $\Sigma = \mathcal{P}(\mathcal{W}) \times \mathbf{R}$.

For any ϕ, $[\![\phi]\!]$ is a **proposition**—a set of worlds. Intuitively, $[\![\phi]\!]$ models the literal content of ϕ. $[\phi]$ is a **CCP**—a function from contexts to contexts. We adopt post-fix notation, so that $\sigma[\phi]$ is the result of applying $[\phi]$ to σ. Intuitively, $\sigma[\phi]$ is the result of integrating the effects of an utterance of ϕ into the context σ.

Corresponding to each interpretation function, we have a dedicated entailment relation. A context σ **incorporates** ϕ ($\sigma \models_{[\![\cdot]\!]} \phi$) iff $c_\sigma \cap [\![\phi]\!] = c_\sigma$. We say that ϕ is **excluded** at σ iff $c_\sigma \cap [\![\phi]\!] = \emptyset$. $\psi_i, \ldots, \psi_j \models_{[\![\cdot]\!]} \phi$ iff any context, when its information state is intersected with $[\![\psi_i]\!] \cap \ldots \cap [\![\psi_j]\!]$, incorporates ϕ. A context σ **accepts** ϕ ($\sigma \models_{[\cdot]} \phi$) iff $c_{\sigma[\phi]} = c_\sigma$. We say that ϕ is **rejected** at σ iff $c_{\sigma[\phi]} = \emptyset$. $\psi_i, \ldots, \psi_j \models_{[\cdot]} \phi$ iff any context, when updated with $\psi_i, \ldots, \psi_j$, accepts ψ.[21]

> **Def. 4.** i. $\sigma \models_{[\![\cdot]\!]} \phi$ iff $c_\sigma \cap [\![\phi]\!] = c_\sigma$
> ii. $\psi_i, \ldots, \psi_j \models_{[\![\cdot]\!]} \phi$ iff for all $\sigma \in \Sigma, c_\sigma \cap [\![\psi_i]\!] \cap \ldots \cap [\![\psi_j]\!] \models_{[\![\cdot]\!]} \phi$

> **Def. 5.** i. $\sigma \models_{[\cdot]} \phi$ iff $c_{\sigma[\phi]} = c_\sigma$
> ii. $\psi_i, \ldots, \psi_j \models_{[\cdot]} \phi$ iff for all $\sigma \in \Sigma,\ \sigma[\psi_i] \ldots [\psi_j] \models_{[\cdot]} \phi$.

Finally, we define a notion of **communicated content** relative to a context. $\mathcal{C}_\sigma(\phi)$ is the communicated content of ϕ relative to σ:

[21] Thus a state σ both accepts and rejects ϕ (and, similarly, both incorporates and excludes ϕ) iff $c_\sigma = \emptyset$.

Def. 6. $\mathcal{C}_\sigma(\phi) = c_{\sigma'[\phi]}$. (where $\sigma' = \langle \mathcal{W}, \mathcal{R}_\sigma \rangle$)

That is, the communicated content of ϕ at σ is the set of worlds which survive in the information state which results from updating the pair comprising the minimal information state and the accessibility relation of σ—i.e., $\langle \mathcal{W}, \mathcal{R}_\sigma \rangle$—with $[\phi]$.[22]

7.2 Static Semantics

For any $\alpha \in$ CON, let $[\![\alpha]\!] \in \mathcal{D}$. We define a static interpretation function which behaves in the standard way with respect to the boolean connectives.

Def. 7. i. $[\![\beta(\alpha)]\!] = \{w \mid [\![\alpha]\!] \in w(\beta)\}$.
ii. $[\![Exactly(\beta)(\alpha)]\!] = [\![\beta(\alpha)]\!]$.
iii. $[\![Roughly(\beta)(\alpha)]\!] = \{w \mid \mathfrak{R}(w) \cap [\![\beta(\alpha)]\!] \neq \emptyset\}$.
iv. $[\![\neg\phi]\!] = \mathcal{W}/[\![\phi]\!]$.
v. $[\![\phi \wedge \psi]\!] = [\![\phi]\!] \cap [\![\psi]\!]$.

w is a $\beta(\alpha)$-world iff $[\![\alpha]\!] \in w(\beta)$. $w \in [\![Exactly(\beta)(\alpha)]\!]$ iff w is a $\beta(\alpha)$-world. Accordingly, the literal contents of $\beta(\alpha)$ and $Exactly(\beta)(\alpha)$ coincide, as desired. $w \in [\![Roughly(\beta)(\alpha)]\!]$ iff w is $\mathfrak{R}$-related to a $\beta(\alpha)$-world. Since the maximal relation, $\mathfrak{R}$, is reflexive, the literal content of $\beta(\alpha)$ is a subset of the literal content of $Roughly(\beta)(\alpha)$, as desired. Negation and conjunction correspond to set complementation and intersection, respectively.[23]

7.3 Dynamic Semantics

i. Atomic wffs.
Update with $\beta(\alpha)$ eliminates any worlds in the input information state which are not equivalent to a $\beta(\alpha)$-world (given what is relevant at σ).

[22] The communicated content of sub-sentential clauses might be thought to play an important role in determining the CCP associated with, e.g., attitude ascriptions. For example, it appears reasonable to think that the effect of asserting (1_B) at σ will be to eliminate all (and only) those worlds in c_σ which are not $\mathcal{R}_\sigma$-related to a world at which Klaus stands in the belief relation to $\mathcal{C}_\sigma(1)$.

(1_B) Klaus believes that Lena arrived at 9 o'clock.

I am grateful to an anonymous referee for *Noûs* on this point.

[23] It is worth noting that the static denotation of a wff can be recovered from its dynamic denotation. The proposition denoted by ϕ is identical to the information state of the output of $[\phi]$ at the context comprising $\mathcal{W}$ and the maximally strong accessibility relation, which relates every world to itself only. That is:

$$[\![\phi]\!] = c_{\sigma_{Max}[\phi]}, \text{ where } \sigma_{Max} = \langle \mathcal{W}, (\lambda ww'.w = w') \rangle$$

Def. 8. $\sigma[\beta(\alpha)] = \langle\{w \in c_\sigma \mid \mathcal{R}_\sigma(w) \cap [\![\beta(\alpha)]\!] \neq \emptyset\},\ \mathcal{R}_\sigma\rangle$.

That is, $w \in c_{\sigma[\beta(\alpha)]}$ iff $w \in c_\sigma$ and w is $\mathcal{R}_\sigma$-related to some $\beta(\alpha)$-world. Observe that $\mathcal{R}_{\sigma[\beta(\alpha)]} = \mathcal{R}_\sigma$; that is, update with $\beta(\alpha)$ leaves the accessibility relation of the context unchanged.

Note, first, that a context may accept $\beta(\alpha)$ despite failing to incorporate $\beta(\alpha)$. Or, put another way, updating with $\beta(\alpha)$ may leave the information state of a context unchanged, even if it contains some non-$\beta(\alpha)$-worlds. Consider an arbitrary context σ such that every world in c_σ is $\mathcal{R}_\sigma$-related to a $\beta(\alpha)$-world but not every world in c_σ is a $\beta(\alpha)$-world itself. Since $c_\sigma \cap [\![\beta(\alpha)]\!] \neq c_\sigma$, σ fails to incorporate $\beta(\alpha)$. Yet, $c_{\sigma[\beta(\alpha)]} = c_\sigma$. So σ nevertheless accepts $\beta(\alpha)$. Indeed, $\beta(\alpha)$ can be accepted at contexts which exclude $\beta(\alpha)$. Even if c_σ contains no $\beta(\alpha)$-worlds itself, σ will accept $\beta(\alpha)$ as long as every world in c_σ is $\mathcal{R}_\sigma$-related to a $\beta(\alpha)$-world. Hence, we account for the observation (in §1) that $\beta(\alpha)$ may be felicitously asserted at a context, despite the fact that its literal content is false at some (or even every) world in the information state.

Second, note that the communicated content of $\beta(\alpha)$ at σ is the set of worlds which survive update of $\mathcal{W}$ with $\beta(\alpha)$ when the former is paired with $\mathcal{R}_\sigma$. This is simply the set of worlds which are $\mathcal{R}_\sigma$-related to a $\beta(\alpha)$-world. Since, for any σ, $\mathcal{R}_\sigma$ is reflexive, it follows that the literal content of $\beta(\alpha)$ is a subset of its communicated content at every context. That is, for any σ, $[\![\beta(\alpha)]\!] \subseteq \mathcal{C}_\sigma(\beta(\alpha))$. Hence we account for the observation (also in in §1) that the communicated content of a loose utterance of a simple sentence will be at least as weak as its literal content.

ii. LT-regulators
Next, we need to introduce clauses for LT-regulators. LT-strengtheners make previously irrelevant differences relevant. To model this effect, we introduce an operator, $^\sim$, in the meta-language, which maps a predicate and relation to a subset of that relation.

Def. 9. $\mathcal{R}^{\sim\beta} = \{\langle w, w'\rangle \in \mathcal{R} \mid w(\beta) = w'(\beta)\}$

w is $\mathcal{R}^{\sim\beta}$-related to w' iff (i.) w is $\mathcal{R}$-related to w' and (ii.) w and w' agree on the extension of β. Intuitively, $\mathcal{R}^{\sim\beta}$ can be thought of as the relation just like $\mathcal{R}$, except that any differences in the extension of β are relevant.

Def. 10. i. $\sigma[\mathit{Exactly}(\beta)(\alpha)] = \langle\{w \in c_\sigma \mid \mathcal{R}_\sigma^{\sim\beta}(w) \cap [\![\beta(\alpha)]\!] \neq \emptyset\},\ \mathcal{R}_\sigma^{\sim\beta}\rangle$;
ii. $\sigma[\mathit{Roughly}(\beta)(\alpha)] = \langle\{w \in c_\sigma \mid \mathfrak{R}(w) \cap [\![\beta(\alpha)]\!] \neq \emptyset\},\ \mathcal{R}_\sigma\rangle$.

Update with $\mathit{Exactly}(\beta)(\alpha)$ has a dual effect. It first restricts the input accessibility relation to relate only worlds agreeing on the extension of β. Second, it eliminates any worlds from the input information state which are not related by this new relation to a $\beta(\alpha)$-world.

As a result, after update with $\mathit{Exactly}(\beta)(\alpha)$ the information state of a context will include no non-$\beta(\alpha)$-worlds. $c_{\sigma[\mathit{Exactly}(\beta)(\alpha)]}$ comprises all and only those worlds in c_σ which are $\mathcal{R}_\sigma^{\sim\beta}$-related to a $\beta(\alpha)$-world. w is $\mathcal{R}_\sigma^{\sim\beta}$-related to w' only if w' agrees with w on the extension of β (that is, $w(\beta) = w'(\beta)$). So, w is $\mathcal{R}_\sigma^{\sim\beta}$-related to a $\beta(\alpha)$-world only if w is a $\beta(\alpha)$-world itself. Furthermore, since $\mathcal{R}_\sigma^{\sim\beta}$ is reflexive, if w is a $\beta(\alpha)$-world, then w is $\mathcal{R}_\sigma^{\sim\beta}$-related to a $\beta(\alpha)$-world. So, w is $\mathcal{R}_\sigma^{\sim\beta}$-related to a $\beta(\alpha)$-world iff w is a $\beta(\alpha)$-world. And hence, $c_{\sigma[\mathit{Exactly}(\beta)(\alpha)]}$ is simply the set of $\beta(\alpha)$-world in c_σ: $c_{\sigma[\mathit{Exactly}(\beta)(\alpha)]} = c_\sigma \cap [\![\beta(\alpha)]\!]$.

It follows that, for $\mathit{Exactly}(\beta)(\alpha)$ to be accepted at a context, every world included in its information state must be a $\beta(\alpha)$-world. That is, $\mathit{Exactly}(\beta)(\alpha)$ is accepted at σ iff σ incorporates $\beta(\alpha)$. Hence, we account for the observation (in §2.1) that ($1_>$)-($3_>$) can be felicitously asserted at a context only if (1)-(3) are true, respectively.

The communicated content of $\mathit{Exactly}(\beta)(\alpha)$ is simply the set of worlds in $\mathcal{W}$ which are $\mathcal{R}_\sigma^{\sim\beta}$-related to a $\beta(\alpha)$-world. This is, in turn, simply the set of $\beta(\alpha)$-worlds in $\mathcal{W}$. So its communicated content is the same as its literal content. That is, $\mathcal{C}_\sigma(\mathit{Exactly}(\beta)(\alpha)) = [\![\mathit{Exactly}(\beta)(\alpha)]\!] = [\![\beta(\alpha)]\!]$. Hence, we also account for the observation that the communicated and literal contents of ($1_>$)-($3_>$) coincide at any context.

Update with $\mathit{Roughly}(\beta)(\alpha)$ eliminates those worlds from the input information state which are not related to a $\beta(\alpha)$-world by the relation of the model which holds the minimal number of differences relevant. That is, $w \in c_{\sigma[\mathit{Roughly}(\beta)(\alpha)]}$ iff $w \in c_\sigma$ and w is $\mathfrak{R}$-related to some $\beta(\alpha)$-world. Update with $\beta(\alpha)$ leaves the accessibility relation of the world unchanged; that is, $\mathcal{R}_{\sigma[\mathit{Roughly}(\beta)(\alpha)]} = \mathcal{R}_\sigma$.[24]

Note that for any σ, $\mathcal{R}_\sigma \subseteq \mathfrak{R}$. So if w is $\mathcal{R}_\sigma$-related to a $\beta(\alpha)$-world, then it is $\mathfrak{R}$-related to $\beta(\alpha)$-world. It follows that if σ accepts $\beta(\alpha)$, then σ accepts $\mathit{Roughly}(\beta)(\alpha)$. Hence, we account for the observation that ($1_<$)-($3_<$) are assertable wherever (1)-(3) are.

The communicated content of $\mathit{Roughly}(\beta)(\alpha)$ is simply the set of worlds in $\mathcal{W}$ which are $\mathfrak{R}$-related to a $\beta(\alpha)$-world. This is the same set of worlds as the literal content of $\mathit{Roughly}(\beta)(\alpha)$. That is, for any σ, $\mathcal{C}_\sigma(\mathit{Roughly}(\beta)(\alpha)) = [\![\mathit{Roughly}(\beta)(\alpha)]\!]$. Hence, we account for the observation that, like ($1_>$)-($3_>$), the communicated and literal contents of ($1_<$)-($3_<$) also coincide.

iii. Negation and Conjunction.
Finally, our language includes negation and conjunction operators.

Def. 11. i. $\sigma[\neg\phi] = \langle c_\sigma \backslash c_{\sigma[\phi]},\ \mathcal{R}_{\sigma[\phi]}\rangle$
ii. $\sigma[\phi \wedge \psi] = \sigma[\phi][\psi]$

[24] This feature draws its motivation from the need to account for the invalidity of the inference from ($1_<$) to (1), and the corresponding invalidity of conditionals such as ($1{*}_{\rightarrow}^{\lesssim}$):

($1{*}_{\rightarrow}^{\lesssim}$) If Lena arrived at roughly 9 o'clock, then she arrived at 9 o'clock.

Update with $\neg\phi$ has a dual effect. First, it returns that subset of the input information state comprising worlds which do not survive update with ϕ. Second, it updates the accessibility relation so that it coincides with the relation resulting from updating the context with ϕ. Accordingly, $\neg\phi$ is accepted at a context iff ϕ is rejected at that context.[25]

Recall our observation in §2.3: If the communicated content of ϕ in context is strictly weaker than the literal content of ϕ, then the communicated content of $\neg\phi$ is strictly stronger than the literal content of $\neg\phi$. Or, to put it another way, negation reverses the relationship between the literal and communicated content of a loose utterance.

This is predicted in our framework. First, recall that the communicated content of ϕ in σ (that is, $\mathcal{C}_\sigma(\phi)$) is the set of worlds which survive update of $\mathcal{W}$ with ϕ when the former is paired with $\mathcal{R}_\sigma$. Next, note that for any context σ, the worlds that survive update by $\neg\phi$ are just the worlds in c_σ which do not survive update with ϕ. Thus, the communicated content of $\neg\phi$ in σ is just the complement of $\mathcal{C}_\sigma(\phi)$ in $\mathcal{W}$. As a result, whenever $[\![\phi]\!] \subset \mathcal{C}_\sigma(\phi)$, it follows that $\mathcal{C}_\sigma(\neg\phi) \subset [\![\neg\phi]\!]$

In contrast, where the communicated and literal content of an assertion of a sentence coincide (i.e., $[\![\phi]\!] = \mathcal{C}_\sigma(\phi)$), the communicated and literal content of their negations will coincide (i.e., $[\![\neg\phi]\!] = \mathcal{C}_\sigma(\neg\phi)$). For example, as we observed above, for any σ: $\mathcal{C}_\sigma(\mathit{Exactly}(\beta)(\alpha)) = [\![\mathit{Exactly}(\beta)(\alpha)]\!]$. Hence, we predict that the communicated content of $\neg\mathit{Exactly}(\beta)(\alpha)$ always coincides with its literal content. This result agrees with the discussion of the data in §2.3 : $(1^{\neg}_{>})$-$(3^{\neg}_{>})$) communicate the same proposition as they literally express in every context.

Finally, note that the treatment of negation in the framework naturally accounts for the infelicity of plain contradictions such as $(1_\perp)$-$(3_\perp)$. Both $\beta(\alpha) \wedge \neg\beta(\alpha)$

[25] Note that non-contradiction is not consistent in its full generality. $(\beta_\dagger)$ is rejected at any context such that $\sigma \models_{[\cdot]} \beta(\alpha) \wedge \neg(\mathit{Exactly}(\beta)(\alpha))$.

$(\beta_\dagger)$ $\quad \neg((\beta(\alpha) \wedge \neg(\mathit{Exactly}(\beta)(\alpha))) \wedge (\beta(\alpha) \wedge \neg(\mathit{Exactly}(\beta)(\alpha)))$

This corresponds to the general failure of non-contradiction over the non-idempotent fragment of the language in dynamic systems (Mandelkern (forthcoming)). However, in common with the most well-known dynamic systems, non-contradiction is valid over the idempotent fragment of the language, and, for all ϕ (whether idempotent or not), either $\sigma \not\models_{[\cdot]} \phi$ or $\sigma \not\models_{[\cdot]} \neg\phi$.

and $\neg\beta(\alpha) \wedge \beta(\alpha)$ are rejected at every context.[26]

Update with $\phi \wedge \psi$ corresponds to sequential update with ϕ and ψ. Recall our observation in §2.2: conjunction fails to commute with respect to the felicitous assertability of certain loose utterances. In particular, we observed that while there are contexts in which instances of $(\beta^{\&}_{\neg})$ can be asserted felicitously, there are no such contexts for instances of $(\beta^{\neg}_{\&})$.

$(\beta^{\&}_{\neg})$ $\beta(\alpha) \wedge \neg Exactly(\beta)(\alpha)$

$(\beta^{\neg}_{\&})$ $\neg Exactly(\beta)(\alpha) \wedge \beta(\alpha)$

This is also predicted in our framework. Importantly, the two sentences denote different CCPs; that is, $[(\beta^{\&}_{\neg})] \neq [(\beta^{\neg}_{\&})]$. This difference in their dynamic denotation is accompanied by a corresponding difference in the contexts at which they are accepted. $\beta(\alpha) \wedge \neg Exactly(\beta)(\alpha)$ is accepted at any (and only) contexts which accept $\beta(\alpha)$ but incorporate $\neg\beta(\alpha)$. That is, it is accepted by σ if no world in c_σ is a $\beta(\alpha)$-world, but every world in c_σ is $\mathcal{R}_\sigma$-related to a $\beta(\alpha)$-world. In contrast, $\neg Exactly(\beta)(\alpha) \wedge \beta(\alpha)$ is accepted by no context.

Consider $(\beta^{\&}_{\neg})$ first. We want to show that a context accepts $\beta(\alpha) \wedge \neg Exactly(\beta)(\alpha)$ iff it accepts $\beta(\alpha)$ and incorporates $\neg\beta(\alpha)$. σ accepts $\beta(\alpha) \wedge \neg Exactly(\beta)(\alpha)$ iff sequential update with $\beta(\alpha)$ and $\neg Exactly(\beta)(\alpha)$ leaves c_σ unchanged. Starting with the left-hand conjunct, note that $c_{\sigma[\beta(\alpha)]} = c_\sigma$ iff every $w \in c_\sigma$ is $\mathcal{R}_\sigma$-related to a $\beta(\alpha)$-world. In this case (and this case only), σ accepts $\beta(\alpha)$. Next, consider the right-hand conjunct. Since $\beta(\alpha)$ leaves the accessibility relation unchanged,

[26] Note that the framework, as stated, cannot account for the infelicity of utterances involving maximal and minimal standards polar antonym gradables such as:

($\perp$) The floor is wet but it is dry.

($\perp'$) The stick is straight but it is bent.

($\perp$), for example, is predicted to be felicitous in a context in which the floor is slightly wet, but the difference between being slightly wet and perfectly dry is conversationally irrelevant (at least assuming the treatment of maximal and minimal standards gradables Kennedy and McNally (2005) and Kennedy (2007) (though cf. Rotstein and Winter (2004))). Interestingly, however, the infelicity of ($\perp$)/($\perp'$) is reminiscent of observations about the contrasting behavior of minimal and maximal standards gradable adjectives in cases of plural predication and donkey anaphora Yoon (1994, 1996), Krifka (1996).

(PP) The baseball cards [got wet/stayed dry].

(DA) Every boy with a baseball card in his pocket [got it wet/kept it dry].

In such constructions, the minimal standards gradable ('wet') receives an existential interpretation, while the maximal standards gradable ('dry') receives a universal one. In (PP), for example, the former requires only that some baseball card got wet, whereas the lattre requires that every baseball card stayed dry (for a treatment of this phenomenon in terms of loose talk, see Champollion et al. (forthcoming). We might accordingly posit that the dynamic denotations of minimal and maximal standards gradables induce existential and universal quantification over the domain of $\mathcal{R}$-accessible worlds, respectively. This will account for the infelicity of ($\perp$)-($\perp'$).

if σ accepts $\beta(\alpha)$, then $\sigma[\beta(\alpha)] = \sigma$. So we need to assess under what conditions σ accepts $\neg \mathit{Exactly}(\beta)(\alpha)$. $c_{\sigma[\neg \mathit{Exactly}(\beta)(\alpha)]} = c_\sigma$ iff no $w \in c_\sigma$ is a $\beta(\alpha)$ world. In this case (and this case only), σ incorporates $\neg\beta(\alpha)$. Thus, σ accepts $(\beta^{\&}_{\neg})$ iff it accepts $\beta(\alpha)$ but incorporates $\neg\beta(\alpha)$,

Now consider $(\beta^{\neg}_{\&})$. We want to show that every context rejects $\neg \mathit{Exactly}(\beta)(\alpha) \wedge \beta(\alpha)$. σ rejects $\neg \mathit{Exactly}(\beta)(\alpha) \wedge \beta(\alpha)$ iff sequential update with $\neg \mathit{Exactly}(\beta)(\alpha)$ and $\beta(\alpha)$ returns a context with an empty information state. Starting with the left-hand conjunct, recall that update with $\neg \mathit{Exactly}(\beta)(\alpha)$ has a dual effect. First, it restricts the accessibility relation of its output; $\mathcal{R}_{\sigma[\neg \mathit{Exactly}(\beta)(\alpha)]} = \mathcal{R}^{\sim\beta}_{\sigma}$ relates only worlds those worlds related by $\mathcal{R}_\sigma$ which agree on the extension of β. Second, it eliminates any $\beta(\alpha)$-worlds from the information state; that is, $c_{\sigma[\neg \mathit{Exactly}(\beta)(\alpha)]}$ is the set of $w \in c_\sigma$ which are not $\mathcal{R}^{\sim\beta}_{\sigma}$-related to a $\beta(\alpha)$-world. This is simply $c_\sigma / [\![\beta(\alpha)]\!]$. Next, consider the right-hand conjunct. $c_{\sigma[\neg \mathit{Exactly}(\beta)(\alpha)][\beta(\alpha)]}$ is the set of $w \in c_{\sigma[\neg \mathit{Exactly}(\beta)(\alpha)]}$ which are $\mathcal{R}^{\sim\beta}_{\sigma}$-related to a $\beta(\alpha)$-world. Yet $\mathcal{R}^{\sim\beta}_{\sigma}$ relates only worlds which agree on the extension of β. So, since $c_{\sigma[\neg \mathit{Exactly}(\beta)(\alpha)]}$ contains only $\neg\beta(\alpha)$-worlds, no $w \in c_{\sigma[\neg \mathit{Exactly}(\beta)(\alpha)]}$ is $\mathcal{R}^{\sim\beta}_{\sigma}$-related to a $\beta(\alpha)$-world. Thus $c_{\sigma[\neg \mathit{Exactly}(\beta)(\alpha)][\beta(\alpha)]} = \emptyset$, for any σ. That is, every σ rejects $(\beta^{\neg}_{\&})$.

Note that while conjunction is non-commutative with respect to acceptance (and, likewise, with respect to rejection), it is commutative with respect to literal content. Since $[\![(\beta^{\&}_{\neg})]\!] = [\![(\beta^{\neg}_{\&})]\!] = \emptyset$, both sentences are excluded by every context. This accounts for the observation that, despite the difference in their felicitous assertability and communicated content, both sentences literally express a contradiction.

Note, finally, that unlike $(1^{\neg}_{\&})$, $(1^{>}_{\&})$ can be asserted felicitously (in an appropriate context):

$(1^{>}_{\&})$ Lena did not arrive at 9 o'clock exactly, but she arrived at roughly 9 o'clock.

Given the clauses for LT-regulators, we are in a position to account for this. In particular, LT-weakeners update the information state on the basis of the minimal relation, $\mathfrak{R}$, rather than the relation of the input context. As such, the effect of the RH-conjunct is insensitive to the restriction on the accessibility relation imposed by the LT-strengthener in the LH-conjunct. More generally, $\neg \mathit{Exactly}(\beta)(\alpha) \wedge \mathit{Roughly}(\beta)(\alpha)$ is accepted at all and only those contexts which accept $\mathit{Roughly}(\beta)(\alpha) \wedge \neg \mathit{Exactly}(\beta)(\alpha)$.

8 Granularity

(1), repeated below, can convey information as weak as the proposition that Lena arrived within ±30 minutes of 9pm. In contrast, the weakest information which can be conveyed by (1_{+2}) is the proposition that Lena arrived within ±30 seconds of 9.02pm. Relatedly, the conjunction of the two sentences, ($1^{\&}_{+2}$), is infelicitous in every context (assuming Lena did not arrive twice).

(1) Lena arrived at 9 o'clock.

(1_{+2}) Lena arrived at 9.02pm.

($1^{\&}_{+2}$) Lena arrived at 9 o'clock and she arrived at 9.02pm.

Neither observation is predicted in our framework. In order to account for them, we need to widen our attention to consider non-semantic features of loose talk. In particular, we need to investigate how a speaker's choice of expression can communicate information about what differences she takes to be relevant in the conversation. An optimality theory based system of the kind developed in Krifka (2002, 2007) (and, more recently, explored in Klecha (2018)) provides a natural model which can be extended to the present account.

First, let us introduce an ordering on terms associated with a particular scale, reflecting the comparative privileged status of different expressions in a context. E.g., '9pm'>'9.30pm' >'9.15pm'>'9.02pm'.... Following Krifka, we can think of the scale as ordering expressions with respect to how 'costly' they are to produce, as long the relevant notion of cost is not merely associated with the length of expression. /fɪf'tin 'mɪnəts/ takes longer than to produce than /twɛlv 'mɪnəts/, but the former is less costly, in the relevant sense, than the latter. We can then identify, for the set of expressions associated with a scale, subsets whose level of privilege is at least as great as some specified element. For example, the proposed ordering on time-denoting expressions will give us the following sets:

X_1 = {... '9pm', '10pm'...}

X_2 = {... '9pm', '9.30pm', '10pm'...}

X_3 = {... '9pm', '9.15pm', '9.30pm', '9.45pm', '10pm'...}

X_4 = {... '9pm', '9.01pm', '9.02pm', '9.03pm', '9.04pm'...}

In a typical context, the relation of pragmatic equivalence will be determined, in part, by the coarsening on the scale of time denoting terms in force in the context. For example, the difference between two times of occurrence for an event will not be relevant, as long as the nearest time which some element of the relevant coarsening picks out is the same for both. That is, in a typical context, there will be some coarsening X_n, such that w and w' are pragmatically equivalent only if the nearest time denoted by a member of X_n to the time at which Lena arrived is the same in w and w' . This principle is independently motivated, since we want to account for the fact that the communicated content of, e.g., (1), is some proposition of the form $\{w \mid \text{Lena arrived within } \pm n\text{min of 9pm at } w\}$.

Assuming that the only issue relevant is the time of Lena's arrival, the coarsenings X_{1-4} determine the following four possible accessibility relations:

$\mathcal{R}_1=\{\langle w,w'\rangle \mid \forall\gamma \in X_1$: Lena arrived at $[\![\gamma]\!]\pm 30$min in w iff $[\![\gamma]\!]\pm 30$min in $w'\}$

$\mathcal{R}_2=\{\langle w,w'\rangle \mid \forall\gamma \in X_2$: Lena arrived at $[\![\gamma]\!]\pm 15$min in w iff $[\![\gamma]\!]\pm 15$min in $w'\}$

$\mathcal{R}_3=\{\langle w,w'\rangle \mid \forall\gamma \in X_3$: Lena arrived at $[\![\gamma]\!]\pm 7.5$min in w iff $[\![\gamma]\!]\pm 7.5$min in $w'\}$

$\mathcal{R}_4=\{\langle w,w'\rangle \mid \forall\gamma \in X_4$: Lena arrived at $[\![\gamma]\!]\pm 30$sec in w iff $[\![\gamma]\!]\pm 30$sec in $w'\}$

That is, w' is $\mathcal{R}_1$-accessible from w iff the unique time within 30min of Lena's arrival which is denoted by an element of X_1 is the same in w and w' (*mutatis mutandis* for $\mathcal{R}_{2-4}$). Note that, as appears desirable, $\mathcal{R}_{1-4}$ are equivalence relations.

Let Dox(s) be the set of worlds compatible with s's belief's. Then, in order to account for the pair of observations at the start of this section, we need only to assume that s's utterances are guided by two (ranked) principles:

I. Assert ϕ in context σ only if Dox(s)$\subseteq c_{\sigma[\phi]}$.

II. Assert ϕ in context σ only if there is no ψ s.t.:
   i. $\mathcal{C}_\sigma(\phi) = \mathcal{C}_\sigma(\psi)$; and
   ii. For every constituent γ in ϕ, there is a constituent γ' in ψ s.t., for some n, $\gamma' \in X_n$ and $\gamma \notin X_n$.

(I.) is the principle that asserting a proposition should not result in a context with an information state which entails a proposition the speaker does not believe. (II.) is the principle that speakers should prefer ways of communicating information which include more privileged expressions. We assume (I.) takes precedence over (II.); that is, speakers will prefer sentences with less privileged constituents to those with more privileged constituents if the latter, but not the former, will result in a context which, for all they believe, might exclude the world of utterance.

Suppose that a speaker asserts (1_{+2}) in a context which is maximally uninformed with regards to Lena's time of arrival. We predict that a hearer can reason about what differences are relevant as follows: if the accessibility relation of the context were $\mathcal{R}_{1-3}$, then (1) would satisfy (I.) iff (1_{+2}) satisfies (I). At each of $\mathcal{R}_{1-3}$, the effect of updating with (1) and (1_{+2}) is the same. Similary, if the accessibility relation of the context were $\mathcal{R}_{1-3}$, then the communicated content of (1) and (1_{+2}) would coincide. Yet '9 o'clock' belongs to more coarsenings than '9.02pm'. Hence, an assertion of (1_{+2}) would violate (II.). So, the speaker must be assuming that the accessibility relation of the context is (at least as strong as) $\mathcal{R}_4$ and must believe that Lena arrived in the interval between 9:01:30 and 09:02:30. That is, by asserting (1_{+2}), the speaker conveys information about what differences they are taking to be relevant in th context. Hence, on the assumption that hearers accommodate the speaker's assumptions about the context, (1_{+2}) will communicate a proposition at least as strong as the proposition that Lena arrived within ±30 seconds of 9.02pm.

No such reasoning regarding what the speaker assumes about the accessibility relation of the context or believes about Lena's time of arrival is possible from an assertion of (1). (1) could be felicitously uttered in contexts which contain any of $\mathcal{R}_{1-4}$ as their accessibility relation, depending on what the speaker believes about Lena's time of arrival. According to the strength of the accessibility relation of the context, (1) could communicate either the information that Lena arrived within ±30 minutes, ±15 minutes, ±7.5 minutes or ±30 seconds of 9pm. Hence, we account for both (i.) the difference in the range of contents capable of being communicated by (1) and (1_{+2}), respectively, and (ii.) the difference in what a hearer can infer about the the speaker's assumptions about the accessibility relation of the context.[27] Finally, consider $(1^{\&}_{+2})$. At any context including $\mathcal{R}_{1-3}$, $(1^{\&}_{+2})$ will violate (II.ii), since it has the same communicated content as (1) (and hence, (1)'s conjunction with itself). Thus, a speaker's choice of expression in asserting the conjunction can be explained only if they take the accessibility relation of the context to be at least as strong as $\mathcal{R}_4$. Yet, $(1^{\&}_{+2})$ is rejected at any context including an accessibility relation at least as strong as $\mathcal{R}_4$—it returns an empty information state. Hence, we have a simple explanation of the infelicity of the $(1^{\&}_{+2})$—what would need to be assumed about the context for the conjunction to avoid violating (II.) would lead it to instead violate (I.).

9 Conclusion

In many cases the proposition conveyed by an utterance is only loosely related to its literal content. Yet, as we have seen, the relation between the communicated and literal content of a loose utterance is subject to strict constraints, capable of being formulated in precise terms. These constraints give rise phenomena such as the non-commutativity of conjunction and strengthening of communicated content under negation. Systematic phenomena require systematic explanation. The account developed in the latter half of the paper aims to give an explanation of this kind.

As characterised here, loose talk is a semantic phenomenon. Though not determined by the truth conditions of a sentence, the effect of a sentence on the relation of pragmatic equivalence at a context is lexically encoded. The present analysis of loose talk thus constitutes one example of the manner in which an apparently pragmatic feature of linguistic communication can be shown to be, in fact, dependent upon conventionalised properties of the language.

The focus of this paper has been on characterizing the linguistic features of

[27] Klecha (2018) makes closely related observations (in a significantly more developed framework), and argues that the same considerations also suffice to explain the asymmetry between the ability of an utterance of a sentence such as (1_{+2}) to raise the conversational 'standards of precision' and the inability of a sentence such as (1) to lower it.

loose talk. Nevertheless, the proposed account might reasonably be thought to have wider implications. Loose talk is frequently cited within philosophy in attempts to explain recalcitrant everyday judgments. For example, work in epistemology has appealed to loose talk to account for concessive knowledge attributions (Davis (2007, 2015)) and belief attributions (Moss (forthcoming)). Work in metaphysics has appealed to loose talk to account for judgements about personal identity (Chisholm (1976)) and ordinary objects (van Inwagen (1990), Merricks (2000)). And work in philosophy of mind has appealed to loose talk to explain our tendency to ascribe to representations the properties they represent (Block (1983), Tye (1995)).

Such appeals incur a requirement to identify what is meant by loose talk and provide diagnostics for distinguishing the phenomenon under consideration. For example, J.L. Austin writes:

> "Sometimes, it is said, we use 'I know' where we should be prepared to substitute 'I believe', as when we say 'I know he is in because his hat is in the hall' : thus 'know' is used loosely for 'believe' [...] The question is, what exactly do we mean by 'prepared to substitute' and 'loosely'?" Austin (1946, 176)

The present paper provides an answer. We will be prepared to substitute a stronger expression (such as ⌜S knows that ϕ⌝) for a weaker (such as ⌜S believes that ϕ⌝) in a conversation just in case every possibility currently under consideration in which the weaker is true is equivalent, in all ways relevant given the aims of the conversation, to a possibility in which the stronger is. That is, we will substitute ⌜S knows that ϕ⌝for ⌜S believes that ϕ⌝just in case every possibility in which S believes that ϕ is equivalent to some possibility in which S knows that ϕ, given the conversational aims. We use an expression (such ⌜S knows that ϕ⌝) loosely just when there is some possibility at which it is false (i.e., at which S does not know that ϕ) but which is equivalent, in all ways which relevant given the aims of the conversation, to a possibility in which it is true (i.e., at which S does know that ϕ).

Perhaps more importantly, it also provides criteria for diagnosing whether a use of an expression should be classified as an instance of loose talk. To the extent that the felicity of the expression's utterance is sensitive to order effects and its communicated content embeds below operators such as negation and downward monotonic determiners, the discussion in §2 suggests that there is reason to think it may be correctly characterised as an instance of loose talk. However, to the extent that it fails to do so, it may be that the utterance would be better characterised as an instance of some distinct phenomenon.

Appendix A Quantification

§2.2 observed that existential quantification fails to commute with respect to felicitous assertability.[28] §2.3 observed that embedding expressions with a loose reading in downward monotonic positions within a quantifier gave rise to a communicated content strictly stronger than the literal content.[29]

In order to account for the interaction of loose talk phenomena with quantification, $\mathcal{L}_{LT}$ must be extended to include variables and generalised quantifiers. Let Var be the set of variables. Where $\alpha, \alpha', \ldots$ are schematic variables over $\text{Con} \cup \text{Var}$, and $\upsilon, \upsilon', \ldots$ over Var:

Def. 12.
$$\mathcal{L}_{LT+} ::= \beta(\alpha) \mid Exactly(\beta)(\alpha) \mid Roughly(\beta)(\alpha) \mid \neg\phi \mid \phi \wedge \psi \mid Some_\upsilon(\phi)(\psi) \mid Every_\upsilon(\phi)(\psi) \mid$$

A model $\mathcal{M}$ is a tuple s.t. $\mathcal{M} = \langle \mathcal{D}, \mathcal{W}, \mathfrak{R}, \mathcal{G}, [\![\cdot]\!], [\cdot] \rangle$. Where $g \in \mathcal{G}$, $g : \text{Con} \cup \text{Var} \to \mathcal{D}$ is an **assignment function**. By stipulation, for all $\alpha \in \text{Con}$, $g, g' \in G$, $g(\alpha) = g'(\alpha)$.

Static and dynamic interpretation functions are indexed to assignment functions. The static denotation of a singular term at an assignment g is its image under g. That is, $[\![\alpha]\!]^g = g(\alpha)$. *Modulo* indexation to assignments, the static and dynamic interpretation of the non-quantificational fragment of $\mathcal{L}_{LT+}$ coincides with that of $\mathcal{L}_{LT}$ in §7. Similarly, communicated content, truth and consistency are relativised to assignments in the obvious way. That is: $\sigma, g \models_{[\![\cdot]\!]} \phi$ iff $c_\sigma \subseteq [\![\phi]\!]^g$; $\sigma, g \models_{[\cdot]} \phi$ iff $\sigma[\phi]^g = \sigma$; and $\mathcal{C}^g_\sigma(\phi) = c_{\sigma'[\phi]^g}$ (where $\sigma' = \langle \mathcal{W}, \mathcal{R}_\sigma \rangle$) .

Let $g^{\upsilon::=?}$ be the set of υ-variants of g:

$$g^{\upsilon::=?} = \{g' \mid \upsilon \neq \upsilon' \supset g'(\upsilon') = g(\upsilon')\}.$$

Quantifiers are treated as binary operators which combine with wffs.

Def. 13.

i. $[\![Some_\upsilon(\phi)(\psi)]\!]^g = \{w \mid \exists g' \in g^{\upsilon::=?} : w \in [\![\phi]\!]^{g'} \cap [\![\psi]\!]^{g'}\}$

ii. $[\![Every_\upsilon(\phi)(\psi)]\!]^g = \{w \mid \forall g' \in g^{\upsilon::=?} : w \in [\![\phi]\!]^{g'} \supset w \in [\![\psi]\!]^{g'}\}$

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[28] That is, ($1\exists^{\&}_{\neg}$)-($1\exists^{\neg}_{\&}$) are non-equivalent:

($1\exists^{\&}_{\neg}$) Someone who arrived at 9 o'clock didn't arrive at 9 o'clock exactly.

($1\exists^{\neg}_{\&}$) ?? Someone who didn't arrive at 9 o'clock exactly arrived at 9 o'clock.

[29] That is, the communicated content of ($1_<$) assymetrically entails that of (1), but the communicated content of ($1_\forall$) assymetrically entails that of ($1^<_\forall$)):

($1_\forall$) Everyone who arrived at 9 o'clock saw the fireworks.

($1^>_\forall$) Everyone who arrived at 9 o'clock exactly saw the fireworks.

iii. $\sigma[Some_\upsilon(\phi)(\psi)]^g = \langle \bigcup_{g' \in g^{\upsilon::=?}} (c_{\sigma[\phi]^{g'}[\psi]^{g'}}), \mathcal{R}_{\sigma[\phi]^{g'}[\psi]^{g'}} \rangle$
iv. $\sigma[Every_\upsilon(\phi)(\psi)]^g = \langle \bigcap_{g' \in g^{\upsilon::=?}} ((c_\sigma / c_{\sigma[\phi]^{g'}}) \cup c_{\sigma[\phi]^{g'}[\psi]^{g'}}), \mathcal{R}_{\sigma[\phi]^{g'}[\psi]^{g'}} \rangle$

$\mathcal{L}_{LT+}$ accounts for the presence of order effects between the restrictor and scope of quantifiers observed in §2.2.

Observation 1. $Some_\upsilon(\cdot)(\cdot)$ is non-commutative with respect to **acceptance**.

To see how the commutativity of existential quantification fails in the extended language, consider:

($\exists^\beta_\neg$) $Some_\upsilon(\beta(\upsilon))(\neg Exactly(\beta)(\upsilon))$
($\exists^\neg_\beta$) $Some_\upsilon(\neg Exactly(\beta)(\upsilon))(\beta(\upsilon))$

Observe that, for some σ, g: $\sigma, g \models_{[\cdot]} (\exists^\beta_\neg)$. That is, there exists a context at which ($\exists^\beta_\neg$) is accepted. To see why, it suffices to note that ($\exists^\beta_\neg$) is accepted at σ and g iff, for each $w \in c_\sigma$, there is an υ-variant of g, g', such that $g'(\upsilon) \notin w(\beta)$ but $g'(\upsilon) \in w'(\beta)$, for some world w' $\mathcal{R}_\sigma$-accessible from w. This condition will be satisfied as long as, for each $w \in c_\sigma$ there is some $d \in \mathcal{D}$ and $w' \in \mathcal{R}_\sigma(w)$ such that $d \notin w(\beta)$ but $d \in w'(\beta)$

In contrast, for all σ, g: $\sigma[(\exists^\neg_\beta)]^g = \emptyset$. That is, ($\exists^\neg_\beta$) is excluded at every context. To see why, consider an arbitrary σ and g. For every assignment, $g' \in g^{\upsilon::=?}$, $c_{\sigma[\neg Exactly(\beta)(\upsilon)]^{g'}[\beta(\upsilon)]^{g'}} = \emptyset$. Yet, since $c_{\sigma[Some_\upsilon(\phi)(\psi)]^g} = \bigcup_{g' \in g^{\upsilon::=?}} c_{\sigma[\phi]^{g'}[\psi]^{g'}}$, it follows that $c_{\sigma[Some_\upsilon(\neg Exactly(\beta)(\upsilon))(\beta(\upsilon))]^{g'}} = \emptyset$.

Next, turn to the observations regarding universal quantification in §2.3.

Observation 2. For all σ, g, if $\mathcal{C}^g_\sigma(\phi) \subseteq \mathcal{C}^g_\sigma(\phi')$:

i. $\mathcal{C}^g_\sigma(Every_\upsilon(\phi')(\psi)) \subseteq \mathcal{C}^g_\sigma(Every_\upsilon(\phi)(\psi))$
ii. $\mathcal{C}^g_\sigma(Every_\upsilon(\psi)(\phi)) \subseteq \mathcal{C}^g_\sigma(Every_\upsilon(\psi)(\phi'))$.

To see how the extended language accounts for the embeddability of communicated content under determiners, consider:

($\forall_\beta$) $Every_\upsilon(\beta(\upsilon))(\beta'(\upsilon))$
($\forall^>_\beta$) $Every_\upsilon(Exactly(\beta)(\upsilon))(\beta'(\upsilon))$
($\forall^\beta_>$) $Every_\upsilon(\beta(\upsilon))(Exactly(\beta')(\upsilon))$

The communicated content of ($\forall^>_\beta$) at σ (and g) is that proposition true at w iff for every individual d, if $d \in w(\beta)$, there is a world w' $\mathcal{R}_{\sigma[Exactly(\beta)(\upsilon)]^g}$-accessible from w such that $d \in w'(\beta')$. In contrast, the communicated content of ($\forall_\beta$) at σ (and g) is that proposition true at w iff for every individual d, if there is a world

w' $\mathcal{R}$-accessible from w such that $d \in w'(\beta)$, there is a world w'' $\mathcal{R}$-accessible from w such that $d \in w''(\beta')$. Since the latter is true at a subset of the worlds the former is true at, $\mathcal{C}^g_\sigma((\forall_\beta)) \subseteq \mathcal{C}^g_\sigma((\forall^>_\beta))$.

The converse relations hold between $(\forall_\beta)$ and $(\forall^\beta_>)$, in which the contrasting formulae $\beta'(v)$ and $Exactly(\beta')(v)$ occur in an upward monotonic environment. The communicated content of $(\forall^\beta_>)$ is the proposition true at w iff for every individual d, if there is a world w' $\mathcal{R}_\sigma$-accessible from w such that $d \in w'(\beta)$, then $d \in w(\beta')$. Hence, $\mathcal{C}^g_\sigma((\forall_\beta)) \subseteq \mathcal{C}^g_\sigma((\forall^\beta_>))$, for any σ (and g).

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