

Parasitic licensing in uncertainty

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Abstract This paper discusses a phenomenon known as ‘parasitic licensing’, in which strong Negative Polarity Items (NPIs), such as English *in weeks*, become acceptable in downward-entailing but non-anti-additive contexts in the presence of a weak NPI, such as English *any*. We show that *in weeks* is not special in the sense that it has some particular requirement that restricts it to anti-additive contexts only, rather *in weeks* is actually a weak NPI whose presuppositional requirements are such that they are in conflict with the presuppositional requirements of non-anti-additive NPI-licensors. We argue that the conflict between the presuppositional requirements of *in weeks*-type NPIs and non-anti-additive licensors can be resolved in the presence of a quantificational expression introducing contextual uncertainty, including *any*. We implement our solution by extending Stalnaker’s diagonalization to presuppositional content (Stalnaker 1978; 2004) and claim that this mechanism is at the heart of the parasitic licensing phenomenon.

Keywords Negative Polarity Items · strength of negation · presupposition · context

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1 Parasitic licensing

Parasitic licensing is the phenomenon where weak Negative Polarity Items (NPIs) can intermediate in the licensing of strong NPIs that would otherwise remain unlicensed (see Klima 1964; den Dikken 2006; Hoeksema 2007). Take the apparently strong NPI *in weeks* that is only licensed in anti-additive environments like *nobody*, and not in non-anti-additive, Strawson downward-entailing contexts like *only*, see (1).

- (1) a. Nobody has read the *New York Times* in weeks.
b. *Only Mary has read the *New York Times* in weeks.

Strikingly, inclusion of a weak NPI such as *any* renders the licensing of *in weeks* by *only* fine again, as in (2).

(2) Only Mary has read any newspaper in weeks.

Parasitic licensing is not possible for every strong NPI, though. Take punctual *until*. Even though punctual *until* is a strong NPI, see (3a-b), it cannot be rescued by means of parasitic licensing, as in (3c).

- (3) a. Nobody left the house until 7pm.
 b. *Only Mary left the house until 7pm.
 c. *Only Mary gave any student a call until 7pm.

In the literature, such cases of parasitic licensing have been discussed, though not yet fully understood (see den Dikken 2006; Hoeksema 2007). In this paper, we address the following questions: why is it that some apparently strong NPIs, such as *in weeks*, can be rescued by means of parasitic licensing? And why does this not hold for every strong NPI?

Our explanation will have two components. First, we show that there are two types of NPIs that are usually described as strong NPIs: true strong NPIs and illusory strong NPIs. True strong NPIs are NPIs whose NPI-triggering properties restrict them to anti-additive contexts. We take punctual *until* to be such a true strong NPI. Illusory strong NPIs are NPIs that are actually weak NPIs, but that have additional presuppositions (or other non-truth-conditional inferences) that further ban them from weak-licensing contexts (i.e., contexts that are Strawson downward-entailing but not anti-additive, like *only*). This makes illusory strong NPIs appear to have the same distribution as true strong NPIs. We argue that *in weeks*-type NPIs are illusory strong NPIs. We will see that only illusory strong NPIs can be involved in parasitic licensing.

Second, we say that NPIs like *any* (and some other expressions) are inherently uncertain, in a sense to be specified later. The presence of an inherently uncertain expression, such as *any*, allows for different presuppositions to be met in different possible worlds that constitute the Context Set, i.e., the set of possible worlds compatible with what is mutually believed by the participants of the conversation in the world in which the utterance takes place (Stalnaker 1978: et seq.). This flexibility permits the offensive presupposition of illusory strong NPIs to be satisfiable in weak-licensing contexts giving rise to the parasitic licensing configuration. To formalize the proposal, we extend the notion of diagonal propositions (Stalnaker 1978; 1999; 2004) to presuppositions.

The flow of the paper is as follows: In Section 2, we discuss the difference between true and illusory strong NPIs and the diagnostics to tell them apart. Section 3 provides some background on the idea of diagonalization in Stalnaker (1978; 1999; 2004). In Section 4, we show how Stalnaker's diagonalization can be extended to presuppositions and applied to explain parasitic licensing of illusory strong NPIs. In this section, we use licensing under *only* as our base example. In Section 5, we show that the same mechanism can be applied to other non-anti-additive, downward-entailing environments where parasitic licensing has also been attested. Section 6 discusses some cases of parasitic licensing beyond *in weeks* and *any*. Section 7 concludes the paper.

2 Two types of strong NPIs

Traditionally weak NPIs are distinguished from strong NPIs in the sense that weak NPIs are, in principle, licensed in all Strawson downward-entailing (DE) contexts and strong NPIs are licensed in anti-additive (AA) contexts only. Given that every anti-additive context is also downward-entailing, the set of possible licensing contexts for weak NPIs then forms a superset of the set of possible licensing contexts for strong NPIs. At the same time, it is known that there are contexts where strong NPIs are better than weak NPIs. Sedivy (1990) shows that there are at least two contexts where strong but not weak NPIs may appear. These are clauses with contrastively used auxiliaries, as in (4), and environments under the scope of modals with a counterfactual inference, as in (5).¹

- (4) a. I DO give a damn.
 b. *Bill DID ever kiss Marilyn Monroe.
- (5) a. You should have given a damn.
 b. *You should have eaten any healthful tofu.

An additional context where strong NPIs may appear but weak ones may not are questions that lack an interrogative clause-type, as shown by Sailer (2021), see (6).

¹The status of *give a damn* as a strong NPI is debatable, given that it can be used in *if*-clauses and under *wish*, see Giannakidou (2011).

- (6) a. And, Alexia has given a damn?
 b. *And, Alexia has ever been to France?

Strikingly, while these tests work well for a strong NPI like punctual *until* (albeit not every speaker of English likes them, which we mark with %), for *in weeks*, even though it is often considered a prototypical strong NPI, these examples are systematically rejected, as shown in (7)-(9). Note that the relevant examples do involve punctual *until* and not polarity-insensitive durative *until*, given that they appear with the perfective while durative *until* can only appear with the imperfective.

- (7) a. %I DID leave until 7pm.
 b. *Bill HAS been there in weeks.
- (8) a. %You should have left until 7pm.
 b. *You should have been there in weeks.
- (9) a. %And, you left until 7pm?
 b. *And, you have been there in weeks?

As Sedivy (1990) has shown, most minimizing NPIs (e.g., *give a damn*, *lift a finger*) also align with strong NPIs. Strikingly, those minimizer NPIs are also degraded in parasitic licensing constructions.

- (10) a. *Only Mary ever gave a damn.
 b. *Only Mary has ever lifted a finger.

Now we have arrived at a paradox. Against these diagnostics, it appears that *in weeks* behaves like a weak NPI rather than like a strong NPI. At the same time, it is still restricted to anti-additive contexts. We use *in weeks* as an example here, but the same observations apply to all *in* + timespan NPIs, such as *in days*, *in years*, *in ages*, and so on. It is to be understood that when discussing *in weeks*, we discuss all *in weeks*-type NPIs.

In order to resolve the above paradox, we propose that *in weeks* is actually a weak NPI, but it comes along with additional inferences that prevent it from appearing under the scope of non-anti-additive, downward-entailing operators like *only*. As an informal illustration, let us consider the example in (11).

(11) *Only John has read the *New York Times* in weeks.

According to the standard analysis of *only*, it comes with the positive inference for (11) that there was a relevant reading event (by John) weeks from now. As shown in Iatridou & Zeijlstra (2019), *in weeks* also comes with a number of additional inferences. One of these inferences is the change-of-state inference that can be represented as the requirement that all relevant events happen either before the timespan set by *in weeks* or within that timespan. *In weeks* also triggers an actuality inference (AI), that is, the inference that there was a relevant event at the Left Boundary (LB) of the contextual timespan. The actuality inference combined with the assertive meaning of (11) requires there to be a relevant reading event before the LB but not after. These inferences taken together form an inconsistent set, as shown in Figure 1, which explains the unacceptability of *in weeks* in weak-licensing contexts, such as in (11).

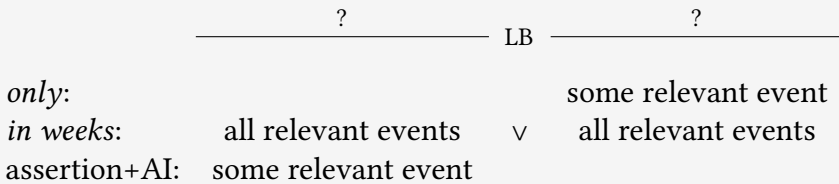


Figure 1 Inconsistent inferences of *in weeks* under *only*

Before formalizing our proposal, we want to point out that this new way of looking at *in weeks*-type NPIs gives us another perspective on parasitic licensing. Strictly speaking, the grammaticality of (2) is no longer surprising because *in weeks* is a weak NPI. The surprising fact is that the inclusion of *any* allows us to dissolve the inconsistencies shown in Figure 1 making *in weeks* acceptable under *only*.

In order to explain illusory strong NPIs and parasitic licensing, we then need to understand what it means for a presupposition to be satisfied in a particular context and whether there are ways of weakening the satisfiability condition under certain circumstances. To this end, we turn to the two-dimensional semantics and the use of diagonalization in Stalnaker (1978; 1999; 2004: et seq).

3 Background: Stalnaker (1978: et seq.)

According to Stalnaker, the role of an assertion is to reduce a Context Set CS_c (Stalnaker 1978: et seq.). That is to say, we have the statement in (12) that holds for Assertions:

- (12) When a sentence S translatable as ϕ is asserted in context c , the context set CS_c is updated with ϕ , i.e., $CS_c \subseteq \{w \in W \mid \phi \text{ is true in } w\}$.

There are three principles that govern CS_c updates:

- (P1) A proposition asserted is always true in some but not all of the possible worlds in the context set.
- (P2) Any assertive utterance should express a proposition, relative to each possible world in the context set, and that proposition should have truth-value in each possible world in the context set.
- (P3) The same proposition is expressed relative to each possible world in the context set (see Stalnaker 1978: 80).

To model this, Stalnaker has developed a two-dimensional framework that allows us to account for the communicative value of utterances when participants of conversation are partially ignorant (or mistaken) about the semantic value of what is said. This framework is based on the intuition that possible worlds play a double role with respect to an utterance. First, they determine the truth-value of the proposition expressed by the utterance (i.e., the standard semantic value). Second, they determine the truth-value of what is expressed by the utterance (i.e., what is being said).

To see this, take Stalnaker's own example. Suppose CS_c consists of three worlds i, j, k in which the speaker truthfully utters *You are a fool* addressing O'Leary. O'Leary, who correctly understands the utterance as addressing him, disagrees with the facts as he believes that he is not a fool. But O'Leary falsely believes that Daniels, another participant of the conversation, is a fool. Daniels, who is not a fool and knows this, misunderstands the utterance as addressing him rather than O'Leary.

In this scenario, i can be said to be the actual world, j the world O'Leary believes we are in, and k the world Daniels believes we are in. We can represent the proposition *You are a fool* in a two-dimensional matrix, as in Figure 2 which uses possible worlds not only in their role as valuation functions (the

horizontal axis), but also in their role as contexts that determine what is being said (the vertical axis). The rows following i and j have the same truth-values since they represent the same proposition, namely *O’Leary is a fool*. The row following k represents the proposition that Daniels erroneously assigns to the utterance, namely ‘Daniels is a fool’.

	i:	j:	k:
i:	T	F	T
j:	T	F	T
k:	F	T	F

Figure 2 Propositional concept for *You are a fool*

The matrix in Figure 2 is called a *propositional concept*, which is defined as a function from possible worlds to propositions or equivalently from a pair of possible worlds to a truth-value.

Propositional concepts are useful, for instance, to resolve the tension between the semantic analysis of identity statements as necessary truths or necessary falsehoods and our general intuition that such statements can be uttered informatively.

As an illustration, consider O’Leary’s assertion in (13).² Let us say this time that $CS_c = \{i, j\}$, where i is the actual world in which the astronomical facts are the way they actually are, that is, Hesperus and Mars are distinct planets, and j is a counterfactual world in which the astronomical facts are the way O’Leary believes they are, that is, Hesperus and Mars are the same planet. Intuitively, O’Leary seems to be asserting a contingent proposition that is false in i and true in j .

(13) O’Leary: Hesperus is Mars.

Now, let us assume that proper names are rigid designators (e.g., Kripke 1980) and that *is* expresses identity. Then, *Hesperus is Mars* is necessarily false, i.e., false in all possible worlds including j . In other words, our semantic rules do not derive a contingent proposition which we intuitively assign to O’Leary’s assertion.

This tension can be resolved (Stalnaker argues) if we look not just at the

²From Stalnaker (1999).

horizontal proposition but at the propositional concept for (13), see Figure 3. Here, we look not only at truth-values the sentence has as it is uttered in the actual world, but at truth-values the sentence has as it is uttered in different possible worlds.

	i:	j:
i:	F	F
j:	T	T

Figure 3 Propositional concept for *Hesperus is Mars*

Our intuition that O’Leary’s assertion expresses a contingent statement can be captured if we say that the content of the assertion is determined by the *diagonal proposition* of the propositional concept.

A *diagonal proposition* is a proposition ϕ that is true in w for each w only if ϕ expressed in w is true in w , that is to say $\phi := \{w \in W \mid \phi_w \text{ is true in } w\}$. Thus, we have (14) instead of (12).

- (14) When a sentence S with *uncertain meaning* translatable as ϕ is asserted in context c , the context set CS_c is updated with the diagonal proposition of ϕ , i.e., $CS_c \subseteq \{w \in W \mid \phi_w \text{ is true in } w\}$.

In cases with identity statements, the diagonal proposition resolves the tension between the principles (P1) and (P3).

4 Polarity licensing and uncertainty

Now, we will apply diagonalization to understand the discussed cases of illusory strong NPis and parasitic licensing. For this, we first discuss some properties of *any* and how it can be combined with a non-AA NPI licenser like *only*. Then, we look at how *only* and *in weeks* interact highlighting *in weeks*’ behaviour as an illusory strong NPI. Finally, we focus on the combination of *only*, *any*, and *in weeks*, that is, the parasitic licensing configuration.

4.1 Weak NPis: the case of *any* and *only*

That *any* is a weak NPI goes without saying. We follow the standard analysis by Chierchia (2013) in accounting for its restriction to Strawson downward-entailing context as the result of exhaustification of its domain alternatives. However, there is more to say about *any*.

We first note that, unlike NPI minimizers like *a red cent*, the domain of *any* does not have to be the widest in the given context. This is supported by the co-occurrence of *any* with exceptives, see (15), and also its acceptability in non-exhaustive contexts, see (16).

- (15) a. Johnny didn't get any pocket money this week, except for \$5 for ice-cream on Friday.
 b. #Johnny didn't get a red cent this week, except for \$5 for ice-cream on Friday.
- (16) Context: You go to a mall with your friend Mary. Mary sees a new coffee machine which she has been looking for. Mary asks you to borrow \$200 to buy the machine. You have \$2 on you to pay for public transportation to go home, but nothing else.
 a. You: I don't have any money on me.
 b. You: #I don't have a red cent on me.

The fact that *any* does not have to range over the widest domain allows it to have varied interpretations in the same context. We call this property of *any* 'uncertainty'. The uncertainty of *any* is different from the implicit domain restriction that all natural language quantifiers are assumed to come with.

To clarify this distinction, let us first sketch how it can be described in theoretical terms using Stalnaker's framework again (Stalnaker 2002; 2014). As mentioned above, in this framework, it is assumed that to understand the content of an assertion is to know what possibilities it rules out. Let us say that an utterance event is presumed to be taking place in a Common Ground context (CG-context), which can be viewed as a set of (uncentered) possible worlds compatible with beliefs of the participants of conversation. That is, the utterance event is presumed to be taking place in each element of the CG-context. The utterance event determines a set of centered possible worlds (K-contexts, for Kaplan-style contexts), each of which contains non-shiftable information about a particular conversation (speaker, addressee, time of utterance, place of utterance, world of utterance) and is used to determine the truth-value of the proposition expressed by the utterance. That is, a CG-context can be seen as a set of K-contexts (i.e., a set of centered

possible worlds), rather than a set of uncentered possible worlds compatible with participants' beliefs. Crucially, the information that can distinguish between the various K-contexts compatible with the common ground does not have to be commonly believed. That is, according to this picture, the content of the utterance relative to one K-context does not have to be the same as the content of that utterance relative to a different K-context.

Returning now to domains of quantification, we can say that the implicit domain restriction of natural language quantifiers (as in *Every student passed the exam*) comes from common ground beliefs and is associated with the CG-context. Thus, the implicit domain restriction does not vary across different K-contexts. (Note that this is not to say that the implicit domain restriction cannot be unsettled in the common ground, in which case accommodation mechanisms will be called for.) In the case of *any money* and *a red cent*, the implicit domain restriction is also set by the common ground. For example, in the context of everyday shopping of a middle-class individual in North America in 2022 as in (16), the implicit domain restriction can be set as ranging from one cent to \$1,500. The difference between *any money* and *a red cent* is that for *any money* the domain of quantification is not fixed as the widest range which allows it to vary across different K-contexts.

As an illustration, consider a scenario similar to the O'Leary situation above, where the mistake in the addressee results in different domain restrictions rather than different values for indexicals. The scenario in (17) is similar to that in (16) but now we have two addressees, each of whom takes your utterance as responding to their respective requests for money.

(17) Context: You go to a mall with your friends Mary and Peter. Peter immediately goes to the food court area to buy all three of you coffee and sandwiches. While waiting for him, Mary sees a new coffee machine which she has been looking for. Mary asks you to borrow \$200 to buy the machine. At this point, Peter returns and hands you your coffee and sandwich worth \$10 expecting you to give him the money. You have \$2 on you to pay for public transportation to go home, but nothing else.

You: I don't have any money on me.

In the scenario in (17), Mary, Peter, and you share same common beliefs

about the conversation including the implicit domain restriction for *any money* as ranging from one cent to \$1,500. The information that is not shared is whether you mean that you don't have enough money for a coffee machine or for the food. In this sense, Peter and Mary understand different propositions in which *any money* has varied domains. Note that cases of the mistaken or confused addressee as in the Peter example in (17) or the O'Leary example in Section 3 are used for illustration. Following Stalnaker, we take them to be examples of a more general case of uncertainty of speaker-meaning.

This shows that sentences with (licensed) *any* are inherently uncertain, in the sense that they can have different interpretations in different possible worlds (or K-contexts).³ For example, if $CS_c = \{i, j, k\}$ and the domain of *any* $D = \{a, b, c\}$, when uttered in i , the domain of *any* can be the widest, i.e., $D_i = \{a, b, c\}$, but when uttered in j or k , the domains can be restricted differently, e.g., $D_j = \{a, b\}$ and $D_k = \{c\}$. Participants of the conversation are not certain which is the actual world.

This means that sentences with (licensed) *any* as in (18a) may trigger diagonalization to avoid violating the no-ambiguity principle (P3) above, see Figure 4.

- (18) a. John didn't read anything.
 b. Assertion (Asr): $\neg\exists x \in \{a, b, c\}[thing(x) \wedge read(j, x)]$
 abbreviated as $\neg(a_1 \vee b_1 \vee c_1)$ where $1 = \text{john}$

	i: $\neg(a_1 \vee b_1 \vee c_1)$	j: $\neg(a_1 \vee b_1)$	k: $\neg c_1$
i: $\neg(a_1 \vee b_1 \vee c_1)$	T	F	F
j: $\neg(a_1 \vee b_1)$	T	T	F
k: $\neg c_1$	T	F	T

Figure 4 Propositional concept for the assertion in (18)

³There is an additional assumption here that there is a one-to-one correspondence between a K-context and an uncentered world in the CG-context (which we represent as the context set CS_c in a particular context c), see Stalnaker (2014). In this paper, we simplify the discussion to two-dimensional semantics without involving K-contexts. The difference between a CG-context and a K-context was invoked only in order to explain the conceptual difference between an implicit domain of quantification and uncertainty of *any*.

As a next step, we propose to extend Stalnaker's conjecture that assertions can be identified as diagonal propositions to presuppositions. In simple cases like *Only John read the New York Times*, (P2) above is satisfied when 'John read the NYT' is entailed by the context set, given (19).

- (19) When a sentence S translatable as ϕ has a presupposition ψ , S is felicitously uttered in context c only if the context set CS_c entails ψ , i.e., $CS_c \subseteq \{w \in W \mid \psi \text{ is true in } w\}$.

Moreover, we propose that presuppositions can also give rise to uncertainty (either due to ignorance or indifference). In such cases, we say that (P2) is satisfied when the diagonal proposition of the presupposition is entailed by the context set, as in (20).

- (20) When a sentence S translatable as ϕ has *an uncertain presupposition* ψ , S is felicitously uttered in context c only if the context set CS_c entails the diagonal proposition of ψ , i.e., $CS_c \subseteq \{w \in W \mid \psi_w \text{ is true in } w\}$.

Now, let us look at the behaviour of weak NPIs like *any* under Strawson downward-entailing elements like *only*. That *any* is an NPI licensed in a Strawson downward-entailing context, we take to be the result of exhaustification of its domain alternatives, following the standard analysis by Chierchia (2013). In addition, we adopt the standard analysis for *only* (see Horn 1969; von Stechow 1999), which takes *only* to presuppose its prejacent. Hence, when *any* with $D = \{a, b, c\}$ appears in the scope of *only* as in (21a), the sentence is defined only if 'John read $a \vee$ John read $b \vee$ John read c '. When defined, (21a) is true only if 'Nobody but John read $a \vee b \vee c$ '.

- (21) a. Only John read anything.
 b. Presupposition (Psp): $\exists x \in \{a, b, c\}[\text{read}(j, x)]$;
 abbreviated as $a_1 \vee b_1 \vee c_1$ where $1 = \text{john}$
 c. Asr: $\neg \exists y \neq j [\exists x \in \{a, b, c\}[\text{read}(y, x)]]$;
 abbreviated as $\neg(a_{2<} \vee b_{2<} \vee c_{2<})$ where $2 <$ stands for 'everyone but john'

Since the domain of *any* does not have to be the widest and can have varied interpretations in the same context, the presupposition of *only* with *any* in its scope is also uncertain: in different possible worlds - say i, j, k ,

- the domain of *any* may be restricted differently. To see this, assume that in *i* the domain is the widest, i.e., $D_i = D = \{a, b, c\}$, but that in *j* and *k*, the domains are restricted as follows: $D_j = \{a, b\}$ and $D_k = \{c\}$. Now, the presupposition of (21a) is different across *i, j, k*. It is $a_1 \vee b_1 \vee c_1$ in *i*, $a_1 \vee b_1$ in *j* and c_1 in *k*. The participants of the conversation are uncertain (or it is irrelevant for the purpose of conversation) which interpretation of *any* is meant. We take such uncertain presuppositions to be satisfied if their diagonal is entailed by the context set, as in the matrix in Figure 5. The matrix in Figure 5 shows that *Only John read anything* is felicitous in the context set that consists of *i, j, k*.

	i: $a_1 \vee b_1 \vee c_1$	j: $a_1 \vee b_1$	k: c_1
i: $a_1 \vee b_1 \vee c_1$	T	T	T
j: $a_1 \vee b_1$	F	T	F
k: c_1	F	F	T

Figure 5 Propositional concept for the presupposition of *only* in (21a)

4.2 Illusory strong NPIs: the case of *only* and *in weeks*

As a next step, we assume that illusory strong NPIs like *in weeks* are not special in the sense that they have some particular requirement that restricts them to anti-additive contexts only, but are actually weak NPIs whose presuppositional requirements are such that they are in conflict with the presuppositional requirements of non-anti-additive NPI-licensors such as *only*. This idea can be thought of as an alternative version of Gajewski (2011), who argues that strong NPI-hood does not involve an inherent distributional restriction to anti-additive contexts, but rather argues that strong NPIs are like weak NPIs sensitive to Strawson downward entailment only, but require the overall meaning contribution and not only the assertion to be Strawson downward-entailing.

Here, we illustrate our proposal for *only* and *in weeks*. First, we follow the essence of Iatridou & Zeijlstra (2019) in assuming that *in + timespan* NPIs like *in weeks* presuppose the presence of a Perfect Time Span (PTS) whose Left Boundary (LB) must be set by the relevant event, and presuppose a change of state, i.e., either before or after PTS' LB no event of the kind may take place. In other words, we assume that (22a) has the presupposition

in (22b) and the assertion in (22c) (where RB = Right Boundary of PTS, UT = Utterance Time, $\tau(e)$ = event run time, μ = measurement of time intervals).⁴

- (22) a. John hasn't read the *New York Times* in weeks.
 b. Psp: \exists PTS [PTS = [LB,RB] \wedge RB = UT \wedge LB $<$ UT \wedge ($\exists e$ [john-read-NYT(e) \wedge $\tau(e)$ \subset PTS] $\vee \exists e$ [john-read-NYT(e) \wedge $\tau(e)$ $<$ PTS])]
 abbreviated as ($x \ll n$) \vee ($n \ll x$) where n = john's reading the NYT event, x = any other relevant event, \ll marks two pieces of information: (i) temporal precedence ($u \ll v = u < v =$ event u precedes event v) and (ii) the placement of LB on the timeline (the events following \ll occur after the LB, and the events preceding \ll occur before the LB)
 c. Asr: $\neg \exists e$ [john-read-NYT(e) \wedge $\tau(e)$ \subset PTS \wedge $\mu(\text{PTS}) = \text{week}$]
 abbreviated as $\neg(x \ll n)$

In addition, we follow Chierchia (2013); Iatridou & Zeijlstra (2019) in assuming that since *in weeks* introduces subdomain alternatives of the PTS that are obligatorily exhausted, *in weeks* is an NPI.

Now, assume that there are three types of reading events: m = John read *Le Monde*, n = John read the *New York Times*, and t = John read the *Toronto Star*. Also assume that there are three worlds i, j, k as below, where the events are ordered on the time scale shown as for example: $m < n \ll t$, where \ll marks that events after \ll happen within the PTS and not before. Now, the presupposition in (22b) is satisfied when, next to there being an n -event at the LB of the PTS, there is an n -event either on the left or on the right of \ll . As shown in (23), worlds i and j satisfy the presupposition of *in weeks* in (22b) and among them only i renders the assertion in (22c) true. Since the assertion contains a downward-entailing operator ($n't$), (22a) is grammatical.

⁴The change of state presupposition of *in weeks* together with the assertion leads to the Actuality Inference (AI) not made explicit here. That the LB is set at the relevant event (see Iatridou & Zeijlstra 2019) is achieved by saying that PTS is the maximal interval. This point is omitted here to simplify the representation of the presupposition. Nothing is lost by this simplification for the purpose of this paper.

(23) Presupposition and assertion of licensed *in weeks*

	<u>i: $m < n \ll t$</u>	<u>j: $m \ll n < t$</u>	<u>k: $m \ll t$</u>
Psp: $(n \ll x) \vee (x \ll n)$	T	T	F
Asr: $\neg(x \ll n)$	T	F	T

Let us focus next on the question as to why *in weeks* may not appear under *only*. As we show below, (24a) is ungrammatical because it is impossible to construct a context set that entails both the presupposition of *only* in (24b) and the disjunct of the presupposition of *in weeks* in (24c) that is compatible with the assertion (i.e., $n_N \ll x$). This is shown in (25) for a context set with two worlds *i* and *j* that have states of affairs similar to what we saw in (23). (We use the following abbreviations: 1 = john, 2< = everyone but john, N = everyone.)

- (24) a. *Only John has read the *New York Times* in weeks.
 b. Psp of *only*: $x \ll n_1$
 c. Psp of *in weeks*: $(x \ll n_N) \vee (n_N \ll x)$
 d. Asr: $\neg(x \ll n_{2<})$

(25) Incompatible requirements of *only* and *in weeks*

	<u>i: $m < n_1 \ll t$</u>	<u>j: $m \ll n_1 < t$</u>
Psp of <i>only</i> : $x \ll n_1$	F	T
Psp of <i>in weeks</i> : $n_N \ll x$	T	F

As the reader can see in (25), the presuppositions of *only* and of *in weeks* trigger a conflict. This is because in terms of events, the presupposition of *in weeks* encompasses all relevant reading events including John's reading events and everybody-else's reading events. We assume this is due to the fact that modification by *in weeks* happens before the subject is merged, given that *in weeks* is a so-called VP adverbial (see Iatridou & Zeijlstra 2019; Rouillard 2020), which enters the structure prior to the head introducing the external argument. That is to say, the presupposition of *in weeks* requires there to be a relevant reading event by everybody, including John, either before or after the LB.

Now, the presupposition of *only* requires John to have read the NYT at some point after the LB, which is only compatible with the $x \ll n_N$ disjunct

of the presupposition of *in weeks*. At the same time, the assertion is only compatible with the $n_N \ll x$ disjunct of the presupposition of *in weeks*. But as the disjunction here must be exclusive, we have incompatible requirements. Hence, the two presuppositional requirements and the assertion in (24b-d) cannot be satisfied at the same time, and (24a) is out.

4.3 Parasitic licensing: the case of *only*, *any*, and *in weeks*

To continue, let us see what happens when both *any* and *in weeks* are used in a negative clause, as in (26a), where $(a_1 \vee b_1 \vee c_1)$ stands for ‘John read $a \vee b \vee c$ ’. Because of *any*’s uncertainty, the presupposition of *in weeks* has become uncertain and is now satisfied when the diagonal proposition of the presupposition is entailed by CS_c . This situation is illustrated in Figure 6 (where for expository purposes we present only the presuppositional disjunct compatible with the assertion).

- (26) a. John hasn’t read anything in weeks.
 b. Psp: $((a_1 \vee b_1 \vee c_1) \ll x) \vee (x \ll (a_1 \vee b_1 \vee c_1))$
 c. Asr: $\neg(x \ll (a_1 \vee b_1 \vee c_1))$

	i: $(a_1 \vee b_1 \vee c_1) \ll x$	j: $(a_1 \vee b_1) \ll x$	k: $c_1 \ll x$
i: $(a_1 \vee b_1 \vee c_1) \ll x$	T	T	T
j: $(a_1 \vee b_1) \ll x$	F	T	F
k: $c_1 \ll x$	F	F	T

Figure 6 Propositional concept of the psp of *John hasn’t read anything in weeks*

Since the presupposition of *in weeks* is now met and since both *any* and *in weeks* are in a downward-entailing context, the sentence is correctly predicted to be fine.

Now, we can make the final step in the analysis. Strikingly, the uncertainty of *any* can rescue the co-occurrence of *only* and *in weeks* in non-negative sentences. The reason is that given *any*’s uncertainty, now both presuppositions can be satisfied, albeit not simultaneously. However, as long as the presupposition diagonal is satisfied, all usage conditions are fulfilled.

- (27) a. Only John has read anything in weeks.
 b. Psp of *only*: $x \ll (a_1 \vee b_1 \vee c_1)$
 c. Psp of *in weeks*: $(x \ll (a_N \vee b_N \vee c_N)) \vee ((a_N \vee b_N \vee c_N) \ll x)$
 d. Asr: $\neg(x \ll (a_{2<} \vee b_{2<} \vee c_{2<}))$

As we can see in Figure 7, for any two disjoint interpretations of the presupposition of *only* (top line in each cell) and the presupposition of *in weeks* (bottom line in each cell), we can have a world that satisfies both. This means that (27a) is grammatical, which explains the phenomenon of parasitic licensing.

	i: $x \ll (a_1 \vee b_1 \vee c_1)$	j: $x \ll (a_1 \vee b_1)$	k: $x \ll c_1$
i: $x \ll (a_1 \vee b_1 \vee c_1)$ any interpr.	T F	T F	T F
j: $x \ll (a_1 \vee b_1)$ $c_N \ll x$	F F	T T	F F
k: $x \ll c_1$ $(a_N \vee b_N) \ll x$	F F	F F	T T

Figure 7 Parasitic licensing: *only* and *in weeks*

For instance, in world *j*, both the presupposition of *only* is met (as John read *a* or *b* in the PTS in *j*), and the presupposition of *in weeks* is met, as everybody read *c* before the PTS and nobody afterwards. The same applies to world *k*, where both presuppositions are met as well (John read *c* within the PTS and everybody read *a* or *b* before it). Since the uncertainty of *any* triggers diagonalization, the two presuppositions can be satisfied with respect to different interpretations of the domain of *any*, rendering the context set consistent and the sentence grammatical.⁵

In the next section, we show that other contexts such as emotive factives, *at most*, and the restrictor of *every*, which disallow *in weeks* but are improved in parasitic licensing configurations, can receive an explanation similar to

⁵It is worth mentioning here that when we talk about diagonalization for the purpose of parasitic licensing, we do not assume that this process necessarily triggers diagonalization for all elements sensitive to it. Whether this is so or not depends on the structure of the context (flat vs. multi-dimensional or even hierarchical). We remain open to different possibilities here, which ultimately depend on empirical facts.

that developed for *only* above.

5 Other instances of parasitic licensing of *in* + timespan NPIs

The general recipe for the infelicity of *in weeks* in non-anti-additive (non-AA) contexts is as follows: the presupposition (or any other inference of a non-AA operator) requires there to be a relevant event after the LB; the presupposition of *in weeks* operates on all relevant events and requires them to occur either before or after LB; the assertive meaning of the non-AA operator plus the Actuality Inference (AI) (i.e., the inference that there is a relevant event at LB, see fn. 4 and Iatridou & Zeijlstra 2019) requires there to be a relevant event before LB. These requirements cannot be met simultaneously, thus, ungrammaticality. This can be schematized as in Figure 8.

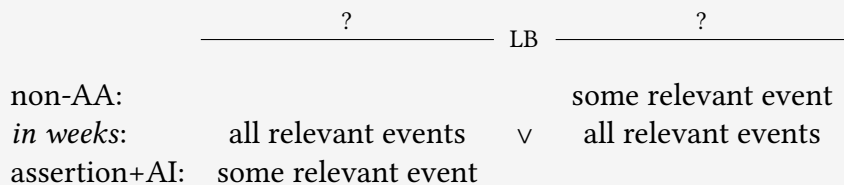


Figure 8 General recipe for ungrammaticality of illusory strong NPIs in non-AA contexts

Uncertainty helps because it triggers diagonalization which in turn allows conflicting requirements to be satisfied with respect to disjoint interpretations of the element carrying uncertainty. Let's now see how this works for other non-AA NPI licensors, such as emotive factives like *surprise*, quantificational DPs like *at most N*, and the restrictor of the universal quantifier *every*.

5.1 *Surprise*

Emotive factives like *surprise* do not license *in weeks* (e.g., von Stechow 1999), see (28). This fact can also be explained in our system as a result of the inconsistency of a context set that entails both the factive presupposition of *surprise* and the presupposition of *in weeks*, see (29).

- (28) a. ??I'm surprised John has been here in weeks.
 b. Psp of *surprise*: $x \ll j$ in the actual world
 c. Psp of *in weeks*: $(j \ll x)$ in all speaker's belief-worlds including the actual world $\vee (x \ll j)$ in all speaker's belief-worlds including the actual world
 d. Asr: $\neg(x \ll j)$ in all previous belief-worlds of the speaker

- | | | | |
|---------|------------------------------------|--------------|--------------|
| | | $i: j \ll x$ | $j: x \ll j$ |
| (29) a. | Psp of <i>surprise</i> : $x \ll j$ | F | T |
| b. | Psp of <i>in weeks</i> : $j \ll x$ | T | F |

Note that we need to assume that the presupposition of *in weeks* cannot be satisfied by different disjuncts when speaker's beliefs are updated. The presupposition is global in Stalnaker's sense.

Parasitic licensing in case of *surprise* is explained similarly to the case with *only*: the diagonal propositions of the factive presupposition of *surprise* and the presupposition of *in weeks* are satisfied by any disjoint set of interpretations of *any*.

- (30) a. I'm surprised anybody has been here in weeks.
 b. Psp of *surprise*: $x \ll (a \vee b \vee c)$ in the actual world
 c. Psp of *in weeks*: $((a \vee b \vee c) \ll x)$ in all speaker's belief-worlds including the actual world $\vee (x \ll (a \vee b \vee c))$ in all speaker's belief-worlds including the actual world
 d. Asr: $\neg(x \ll (a \vee b \vee c))$ in all previous belief-worlds of the speaker,

	$i: x \ll (a \vee b \vee c)$	$j: x \ll (a \vee b)$	$k: x \ll c$
$i: x \ll (a \vee b \vee c)$	T	T	T
any interpr.	F	F	F
$j: x \ll (a \vee b)$	F	T	F
$c \ll x$	F	T	F
$k: x \ll c$	F	F	T
$(a \vee b) \ll x$	F	F	T

Figure 9 Parasitic licensing: *surprise* and *in weeks*

5.2 At most

At most is a downward-entailing, non-AA weak licenser which does not license *in weeks* but can participate in parasitic licensing.

- (31) a. *At most 5 students have been here in weeks.
 b. At most 5 students have talked to anybody in weeks.

The conflicting inferences for (31a) are shown below in (32). They follow the general recipe. The non-empty set implicature can be satisfied only by a CS that entails the first disjunct of the presupposition of *in weeks*. But in such a CS, the assertion is false. Note again that we need to assume that the relevant domain of students exceeds 5.

- (32) a. Implicature (Impl) of *at most: x* << some student' being here event
 b. Psp of *in weeks: (x* << all students' being here events) \vee (all students' being here events << *x*)
 c. Asr: $\neg(x$ << 6 or more students' being here events)

Diagonalization helps because, as above, the conflicting inferences can be satisfied with respect to disjoint interpretations of the uncertain element:

- (33) a. Impl of *at most: x* << some student' event $a \vee b \vee c$
 b. Psp of *in weeks: (x* << all students' event $a \vee b \vee c$) \vee (all students' event $a \vee b \vee c$ << *x*)
 c. Asr: $\neg(x$ << 6 or more students' event $a \vee b \vee c$)

5.3 Every

The restrictor of *every* is AA, yet strong NPIs are not licensed there presumably because of the upward-entailing non-empty set presupposition brought in by the relative clause (Gajewski 2011; Chierchia 2013). But in the parasitic licensing configuration acceptability improves.

- (34) a. *Every student who has been here in weeks is asked to stay home.
 b. Every student who has talked to anybody in weeks is asked to stay home.

As above, the inconsistency of CS arises only if we assume that the events in the presupposition of *in weeks* form a superset of events quantified over

in the assertion. That is to say, the assertion is felicitous in *CS* where some student's being here event $\ll x$.

- (35) a. Psp of relative clause: $x \ll$ some student being here event
 b. Psp of *in weeks*: $(x \ll$ all students' being here events) \vee (all students' being here events $\ll x$)
 c. Asr: all students are such that if $x \ll$ students' being here event, then ...

As before, diagonalization can do the job:

- (36) a. Psp of rel.cl: $x \ll$ some student' event $a \vee b \vee c$
 b. Psp of *in weeks*: $(x \ll$ all students' event $a \vee b \vee c$) \vee (all students' event $a \vee b \vee c \ll x$)
 c. Asr: all students are such that if $x \ll$ students' event $a \vee b \vee c$, then ...

6 Beyond *in weeks* and *any*

6.1 Beyond *in weeks*

As Sedivy (1990) has shown, most minimizing NPIs (e.g., *give a damn*, *lift a finger*) align with strong NPIs, see (37a). Interestingly, these minimizers are also degraded in parasitic licensing constructions, see (37b).

- (37) a. *Only Mary ever gave a damn.
 b. *Only Mary has ever lifted a finger.

If the Sedivy-Sailer tests distinguish between true strong NPIs and weak NPIs, the unavailability of parasitic licensing with minimizers is expected. This is because minimizers as presumably true strong NPIs (including punctual *until*) have licensing conditions that restrict them to anti-additive contexts (e.g., Gajewski 2011).

A more interesting line of investigation can be developed if we try to connect Sedivy-Sailer tests with parasitic licensing. The hypothesis then will be that the property that disallows true strong NPIs from parasitic licensing is exactly what allows them in Sedivy-Sailer contexts.

6.2 Beyond *any*

Our account of parasitic licensing builds on the observation that *any* is inherently uncertain. It does not depend on the NPI-hood of *any* as such. This predicts that non-NPI elements that give rise to uncertainty (and do not give rise to additional intervening inferences) can participate in parasitic licensing.⁶

This prediction is borne out (at least) for the following cases (Kenyon Branen, p.c.):⁷

- (38) a. Only John has talked to Mary, Sue or God knows who in weeks.
 b. Only John has talked to Mary, Sue or whoever he wanted to in weeks.

7 Conclusions

To conclude, we have seen that apparently strong NPIs like *in weeks* are not special in the sense that they have some particular requirement that restricts them to anti-additive contexts only, but are actually weak NPIs whose presuppositional requirements are such that they are in conflict with the presuppositional requirements of non-anti-additive NPI-licensors. Given our implementation of Stalnaker's diagonal for presuppositions, the inclusion of uncertain NPIs like *any* in clauses where *in weeks*-type NPIs

⁶The parenthetical remark that a quantifier that gives rise to uncertainty can be part of a parasitic licensing construction only if it does not have additional inferences is important. An anonymous reviewer asks why quantifiers like *every*, *many*, *some*, assuming they can be uncertain, do not improve the acceptability of sentences with *in weeks*, e.g., **Only John talked to someone/some student(s)/many/few students in weeks*. We take this to be a simple case of intervention similar to **Only John said many words to anybody*, where a positive inference generated by the intervening quantifier disrupts the downward-entailing environment necessary for the licensing of *any*, thus, rendering the sentence trivial (e.g., Chierchia 2013).

⁷An anonymous reviewer correctly points out that *God knows who* and *whoever he wanted to* are akin to free choice items. We believe that the fact that free choice items participate in parasitic licensing agrees with our proposal as free choice items have epistemic uncertainty hard-wired in their meaning. Our proposal, however, is that a weaker property of giving rise to pragmatic uncertainty due to a non-widest-domain requirement (as it is the case with *any*) is enough to participate in parasitic licensing. Evidence for the weaker pragmatic uncertainty comes from the fact that NPIs that do not have a connection to free choice items like English *ever* and Dutch *ooit* 'ever' can participate in parasitic licensing.

appear in non-anti-additive, downward-entailing contexts ensures that the apparent conflicting presuppositional requirements of the *in weeks*-type NPI and the weak NPI-licenser can still be met.

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