Parasitic licensing in uncertainty

Julie Goncharov — University of Göttingen
Hedde Zeijlstra — University of Göttingen

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 strong NPI *in years* that is only licensed in anti-additive environments like *nobody*, and not in non-anti-additive, (Strawson) downward entailing contexts like *only*:

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

Strikingly, inclusion of a weak NPI such as *any* renders the licensing of *in years* by *only* fine again:

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

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 question: why is it that strong NPIs like *in years* can be rescued by means of parasitic licensing? Below, we show that this is due to the fact that NPIs like *any* are inherently uncertain, and we demonstrate that a treatment of uncertainty along the lines of Stalnaker (1978, 2004) provides a natural account for the above-discussed facts.

2 Background: Stalnaker 1978, 2004, et seq.

According to Stalnaker, the role of an assertion is to reduce a Context Set CS_c, i.e., a 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, 2004). That is to say, we have the following statement (A) for Assertions:

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

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 (Stalnaker 1978, 2004, et seq.). 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 in figure 1 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'.

The matrix in figure 1 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 semantic theories that analyze identity statements, such as *Hesperus is Phosphorus*, as necessary truths, and our general intuition that such statements can be uttered informatively, for if the astronomical facts determining the reference of the names had been different, the proposition would be necessarily false, see figure 2.

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

Figure 1: *You are a fool*

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

Figure 2: *Hesperus is Phosphorus*

The conversational goal of uttering *Hesperus is Phosphorus* is to inform that the actual world is as in i, but not as in j. This goal cannot be achieved by updating CS_c with the horizontal (necessary) propositions, but it can be achieved by the *diagonal proposition*. *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 $\phi := \{w \in W : \phi_w$ is true in $w\}$. Thus, we have (A'). In cases with identity statements, the diagonal proposition resolves the tension between the principles (P1) and (P3) above.

(A') 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., $CS_c * \phi = CS_c \subseteq \{w \in W : \phi_w$ is true in $w\}$.

3 Application

3.1 Weak NPIs: the case of *only* and *any*

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 NYT*, (P2) above is satisfied when 'John read NYT' is entailed by the context set, given (P), the counterpart of (A) applied to presuppositions:

(P) 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., $CS_c \subseteq \{w \in W : \psi$ 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 (P'):

(P') 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., $CS_c \subseteq \{w \in W : \psi_w \text{ is true in } w\}$.

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 Fintel 1999; Chierchia 2013), which takes *only* to presuppose its prejacent. Hence, when *any* with $D = \{a, b, c\}$ appears in the scope of *only* as in (3), the sentence is defined only if 'John read a $\vee$ John read b $\vee$ John read c'. When defined, (3) is true only if 'Nobody but John read $a \vee b \vee c$'.

(3) Only John read anything.
Psp $\exists x \in \{a, b, c\}[thing(x) \wedge\ read(j, x)]$; abbreviated as $a_1 \vee b_1 \vee c_1$ where $1 = $ john
Asr: $\forall y[\exists x \in \{a, b, c\}[thing(x) \wedge\ read(y, x)] \rightarrow\ y = j]$; 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 (an assumption supported by the co-occurrence of *any* with exceptives and its acceptability in non-exhaustive contexts), the presupposition of *only* with *any* in its scope is 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 (3) 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 3. The matrix in figure 3 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 3: Propositional concept for the presupposition of *only* in (3)

3.2 Strong NPIs: the case of *only* and *in weeks*

As a next step, we assume that strong NPIs 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-licensers 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 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 that 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 (4) has the following presupposition and assertion (where RB = Right Boundary of PTS, UT = Utterance Time, $\tau(e)$ = event run time, μ = measurement of time intervals).

(4) John hasn't read the *New York Times* in weeks.

Psp: $\exists$ PST [PST = [LB,RB] $\wedge$ RB = UT $\wedge$ LB $\prec$ UT $\wedge$

($\exists e$ [john-read-NYT(e) $\wedge$ $\tau(e) \subset$ PTS] $\vee$ $\exists e$ [john-read-NYT(e) $\wedge$ $\tau(e) \prec$ PTS])][1]

Asr: $\neg\exists e$ [john-read-NYT(e) $\wedge$ $\tau(e) \subset$ PTS $\wedge$ μ(PTS) = week]

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

Now, assume that there are three types of reading events: m = John read *Le Monde*, n = John read the *NYT*, and t = John read *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. Now, the presupposition of (4) is satisfied when there is an n-event either on the left or on the right of $\ll$. Using our matrix representation, we see in figure 4 that worlds i and j satisfy the presupposition of *in weeks* and among them only i renders the assertion in (4) true. Since the assertion contains a downward entailing operator (*n't*), (4) is grammatical.

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

Figure 4: Asr and psp for (4)

Let us focus next on the question as to why *in weeks* may not appear under *only*. As we show below, (5) is ungrammatical because it is impossible to construct a context set that entails both the presupposition of *only* and the disjunct of the presupposition of *in weeks* that is compatible with the assertion (we use the following abbreviations: 1 = john, 2< = everyone but john, N = everyone):

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

Psp of *only*: $x \ll n_1$

Psp. of *in weeks*: $(x \ll n_N) \vee (n_N \ll x)$

Asr: $\neg(x \ll n_{2<})$

	i: $m < n_1 \ll t$	j: $m \ll n_1 < t$
Psp. of *only*: $x \ll n_1$	F	T
Psp. of *in weeks*: $n_N \ll x$	T	F

Figure 5: Incompatible requirements of *only* and *in weeks*

As the reader can see in figure 5, the presuppositions of *only* and of *in weeks* trigger a conflict. The presupposition of *in weeks* requires there to be a relevant reading event by everybody, including John, at the Left Boundary of its PTS (just like *nobody has read the NYT in weeks* presupposes that everybody read the *NYT* at the LB). In addition, *in weeks* presupposes that either no such reading event took place were before *or* after the LB. The presupposition of *only* requires John to have read the NYT at some point after the PTS, and thus requires $x \ll n_N$ to hold (and not $n_N \ll x$). But this presupposition is sheer contradiction with the assertion. Hence, the two presuppositional requirements and the assertion of (5) cannot be satisfied at the same time, and (5) is out.

[1] That LB is set at the relevant event 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.

3.3 Parasitic licensing: the case of *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 (6) (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).

(6) John hasn't read anything in weeks.
Psp: $((a_1 \vee b_1 \vee c_1) \ll x) \vee (x \ll (a_1 \vee b_1 \vee c_1))$
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 *in week*'s presupposition is now met and since both *any* and *in weeks* are in a downward entailing context, the sentence is correctly predicted to be fine.

Strikingly, the uncertainty of *any* can also 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.

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

	i: $x \ll (a_1 \vee b_1), c_N \ll x$	j: $x \ll c_1, (a_N \vee b_N) \ll x$
Psp. of *only*: $x \ll c_1$	F	T
Psp. of *in weeks*: $(a_N \vee b_N) \ll x$	F	T

Figure 7: Parasitic licensing

As we can see in figure 7, for any two disjoint interpretations of the presupposition of *only* and the presupposition of *in weeks* we can have a world that satisfies both. This means that (7) is grammatical even though *in weeks* is not in an anti-additive but only in a (Strawson) downward entailing environment. This explains the phenomenon of parasitic licensing.

4 Conclusions and outlook

To conclude, we have seen that strong NPIs like *in years* 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-licensers. Given our implementation of Stalnaker's diagonal for presuppositions, the inclusion of uncertain NPIs like *any* in clauses where strong NPIs appear in non-anti-additive, downward entailing contexts ensures that the apparent conflicting presuppositional requirements of the strong NPI and the weak NPI-licenser can still be met.

The account advanced here can be straightforwardly extended to parasitic licensing in other contexts, such as factive verbs and the restrictor of *every*. We also provide an account of how other NPIs with strong distribution, such as *until* and *a red cent* behave regarding parasitic licensing.

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