Action Sensitivity in Grammar

Modals, Imperatives, and Polarity Items.
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A. Polarity: An introduction and the early years.

Negative Polarity Items (NPIs) are items like *ever, anybody, lift a finger, much*
The term "negative polarity" (Klima 1964) is used to make reference to the fact that they are good in sentences with negation, but often bad without it:

1. I didn't see any boy
2. *I saw any boy

3. He didn't ever lie
4. *He ever lied

However, it is crystal clear that the licensing environments do not just include negative sentences:

5. He is taller than anybody
6. If you ever go to Cambridge, you should eat at Oleana's.
7. Everybody who has ever talked to her, knows how charismatic she is
8. I am sorry that I ever said that

There are many more environments like those in (5)-(8): not containing an overt negation, yet licensing NPIs.

So, the first question is if a common characterization of these environments is possible. That is, what is/are the necessary condition(s) for NPI licensing? We are going to summarize two early accounts here, the one by Ladusaw, and the one by Linebarger, skipping, unfortunately, Klima 1964 and Baker 1980 for reasons of time. In the next part we will look at some more recent proposals.

Ladusaw (1979, 1980, and more)

The most famous proposal that addresses the question of what licenses an NPI is a line of reasoning initiated by Ladusaw 1979[1]. According to Ladusaw, NPIs are licensed in downward entailing (DE) environments. What does downward entailment mean? How can we tell whether an environment is DE?

[1] Ladusaw acknowledges debt to Fauconnier (1975). We will return to Fauconnier shortly.

Consider some true sentence with a constituent X. By definition, X is in a DE environment if when we replace X with another constituent Y denoting a subset of X, the resulting sentence is true. So, if a sentence with the semantically "bigger" constituent X necessarily entails the sentence where X is replaced with a semantically "smaller" Y, then X is in a downward entailing enviroment: there is necessary entailment from supersets to subsets. [2]

If there is a necessary inference in the other direction, from subsets to supersets, the environment is **upward entailing**. If there is no necessary inference either way, the environment is called **non-monotone.**

Let's look at how this works for the sentence in (9). Our X is "a bike", our Y is "a red bike". Whenever we informally have a "situation" with a red bike, it is necessarily a situation with a bike. So our Y is a subset of X. Now we assume that (9) is true, and check what is our intuition about (10) given that assumption:

9. I didn't see a boy with a bike
10. I didn't see a boy with a red bike.

Clearly if (9) is true, then the sentence (10) is true as well. I could not have seen a boy with a red bike if I have not seen any boy with a bike. We thus have inference from supersets to subsets, so we conclude "a bike" in (9) is in a DE environment.[3]

By Ladusaw's proposal, this environment can license an NPI, and it is borne out by the data:

11. I didn't see a boy with any bike.

On the other hand, if we take negation out of 9, there is no downward entailment in this position anymore. Sentence 12 does not entail sentence 13:

12. I saw a boy with a bike
13. I saw a boy with a red bike

In fact, the entailment here is the other way round: if (13) is true, then (12) is necessarily true. "A bike" in (12) is thus in an upward entailment environment.

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[2] Formally, the syntactic environment δ is downward entailing iff $\forall X \forall Y([[Y]] \subseteq [[X]]) \rightarrow ([[\delta(X)]] \rightarrow [[\delta(Y)]])$

[3] More accurately, we should have checked that it is always the case that entailment is always from supersets to subsets in that environment, that we were not fooled by a poor choice of particular X and Y. In practice, it is usually enough to apply the test to a couple of different pairs of X and Y to convince oneself and others that entailment always holds.

The prediction of Ladusaw's account is that an NPI is not possible here and this is correct:

14. *I saw a boy with any bike

Ladusaw's proposal makes a lot of correct predictions outside the domain of negative sentences. Famously, it correctly predicts which determiners can license NPIs. Take the determiners every, some, and no. Each of these has a restrictor (first argument) and a scope (second argument) and we should check the DE properties of both environments. The results that surface are captured in Table 1. The test sentences follow.

	every		some		no	
	restrictor	scope	Restrictor	scope	restrictor	scope
DE	+	-	-	-	+	+

Every

Restrictor:

15. Every [boy who has a bike] [came to my party] →
Every [boy who has a red bike] [came to my party]

Scope:

16. Every [boy] [has a bike] -/→ Every [boy] [has a red bike]

Some

Restrictor:

17. Some [boy who has a bike] [came to my party] -/→
Some [boy who has a red bike] [came to my party]

Scope:

18. Some [boy] [has a bike] -/→ Some [boy] [has a red bike]

No

Restrictor:

19. No [boy who has a bike] [came to my party] →
No [boy who has a red bike] [came to my party]

Scope:

20. No [boy] [has a bike] → No [boy] [has a red bike]

Ladusaw's prediction is that an NPI will be licensed only in the boxes in Table 1 in which there is a + for DE. That is, he predicts Table 2. That this prediction is correct is shown in the sentences that follow.

Table 2.

	every		some		no	
	restrictor	scope	Restrictor	scope	restrictor	scope
NPI	√	*	*	*	√	√

Every

Restrictor:

21. Every [boy who has ever been to one of my parties] [has a bike]

Scope:

22. *Every [boy] [has ever been to one of my parties]

Some

Restrictor:

23. *Some [boy who has ever been to one of my parties] [has a bike]

Scope:

24. *Some [boy] [has ever been to one of my parties]

No

Restrictor:

24. No [boy who has ever been to one of my parties] [has a bike]
Scope:

25. No [boy] [has ever been to one of my parties]

Determiners provide just one example of environments that are DE and license NPIs without having overt negation in them. As we said, Ladusaw's account has been very influential and has seeded several developments (see Van der Wouden 1994, Ladusaw 1996, Zeijlstra 2011 for an overview and dicussion of the different kinds of approaches it inspired). It is mostly[4] a semantic account, in that the licensing environment has to meet a certain semantic description.

Linebarger (1980, 1987)

Linebarger finds fault with Ladusaw because there are environments that are not DE, yet license NPIs, and there are environments that are DE, yet do not license NPIs.

Here are some licensing environments that do not meet DE requirement:

Adversatives:

26. She was amazed that there was any food left
27. I was surprised that he budged an inch
28. We were astounded that she lifted a finger to help

These license NPIs but are not DE in obvious way:

29. a. Mary was surprised that John bought a car -/→
    b. Mary was surprised that John bought a Mercedes

After

30. She persisted long after she had any hope at all of succeeding
31. He kept writing novels long after he had any reason to believe they would sell

NPIs are good here, even though the environment does not appear to be DE:

32a. She became ill long after eating a contaminated vegetable -/→
  b. She became ill long after eating contaminated kale

Only

Scope:
33. Only John has ever been there

[4] The use of "mostly" refers here to the fact that Ladusaw also stipulates a syntactic condition, namely that if negation is the DE trigger, negation should c-command the NPI at S-structure; merely LF c-command will not suffice. We will not focus on this here.

Restrictor:
34. Only the students who had ever read anything about phrenology attended the lectures

Again, NPIs are good here, even though the environment does not appear to be DE:

35a. Only people who have had a debilitating illness can appreciate what an ordeal this was -/→
b. Only people who have had polio can appreciate what an ordeal this was

Exactly

Scope:

36. Exactly four people in the whole world have ever read that dissertation: Bill, Mary, Tom, and Ed.

NPIs are good here, even though the environment does not appear to be DE:

37a. Exactly four people in the world have heard Leonard recite poetry: Bill, Mary, Tom and Ed -/→
b. Exactly four people in the world have heard Leonard recite Greek poetry: Bill, Mary, Tom and Ed

Several of these issues have been addressed over the years by researchers who believe in the (general idea of the) DE-theory of NPI-licensing (Von Fintel, building on proposals by Kadmon & Landman, addressed adversatives and only; other refinements have been proposed by Van der Wouden (1994), Zwarts (1995) and Giannakidou (1999)).

Even though some of the problems with Ladusaw's account pointed out by Linebarger have been addressed by supporters of the DE view, the influence of Linebarger's proposal remains. Here are some details of how she thinks NPI licensing works.

According to Linebarger, an NPI is licensed by either

A. being in the immediate scope of negation in the sentence in which it occurs
or
B. being in the immediate scope of negation in a sentence that is alluded to ("derivative licensing")

Let's go through each of these conditions in turn.

The Immediate Scope Constraint (ISC)

According to the ISC, one way of licensing an NPI is if it is in the immediate scope of negation. That is, if there is a scopal element intervening between negation and the NPI, the NPI is not licensed, even though negation still c-commands it:

38. * Neg> Scopal element > NPI

Compare the following two examples:

39. She didn't wear a pair of earrings to every party
40. She didn't wear any pair of earrings to every party

Sentence (39) permits two scopal orders in which negation takes widest scope:

41. Not >∃>∀
    There are no earrings that she wore at every party

42. Not >∀>∃
    It's not the case that at every party she wore earrings

But sentence (40) permits only the scopal order in (41), Not>∃>∀. That is, (40) cannot mean "It is not true that every party was such that she wore no earrings at it", while (39) easily can. Note that the environment of the NPI in (40) on the reading in (42) still remains DE,[5] so Ladusaw's account predicts the NPI should be licensed. But it is not. This is a different type of counterexample to Ladusaw's account than the ones seen before, where we saw NPIs licensed in non-DE environments like adversatives, after, only and exactly. In (40) under the reading (42), the environment is DE but an NPI is not licensed.

Under Linebarger's account, the reason for it is that on the relevant reading Not>∀>∃, the NPI is not in the immediate scope of negation, because the universal quantifier intervenes.

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[5] Cf. (39) under the reading in (42) with the following example under the same scopal reading:

i. She didn't wear a pair of red earrings to every party.

If (39) is true on the Not>∃>∀ reading, it follows that (i) is true as well. It is easier to check that using contraposition: assume that (i) is false. Then at every party, she had a pair of red earrings. But then it can't be that at some parties, she had no earrings at all. This means that (39) really entails (i): it is impossible to have (i) false, and (39) true.

Linebarger has other examples in favor of the ISC, including a famous one involving because-clauses (you can read that one on your own). The ISC shows that c-command of the NPI by negation in the same sentence or even the same clause is not a sufficient condition for licensing. The validity of the ISC is still very much accepted and there have been attempts to understand it in syntactic terms as well (cf. Guerzoni 2006, Chierchia 2013.)

However, the ISC also has its limitations. For example, von Fintel and Iatridou 2007 observe that modals do not cause intervention effects:

43. You don't have to bring anything to my party

With the universal modal in (43) we get the exact scopal order that wasn't permitted before, namely Not >∀>∃:[6] it produces the meaning "It is fine if you just bring nothing", which the sentence clearly has.

Derivative Licensing[7]

An NPI can be licensed in a sentence without negation as long as there is *allusion* to a sentence in which the NPI appears in the immediate scope of negation. This other sentence is called the Negative Implicatum (NI). The NI should not be an entailment of the sentence, or we would be expecting NPIs to occur everywhere, given that any sentence S is equivalent to Neg>Neg>S. For Linebarger the NI should be an implicature of S.

More specifically (simplified from her p. 346):

An NPI contributes to a sentence S in which it appears the conventional implicature that the following two conditions are satisfied[8]:

I. There is a Negative Implicatum, which is implicated by S and which is part of what the speaker is attempting to convey in uttering S. In the LF of the sentence expressing the NI, the NPI occurs in the immediate scope of negation.
II. NI is stronger than S. In other words the truth of the NI entails the truth of S.

[6] Why is the modal have to a universal quantifier here? Because it is indeed a universal quantifier over worlds. The standard semantics for "You have to eat the peas" is roughly like this: "In every world where you meet your obligations, you have eaten the peas". The place of every world in the paraphrase marks the scope of the modal.

[7] Here Linebarger is heavily influenced by the work of Lee Baker on NPI licensing.

Let's look at some sentences.

Recall that the licensing of NPIs in the scope of after were a problem for Ladusaw's DE analysis. For Linebarger the NPIs are licensed there because they appear in the immediate scope of negation in the negative implicatum (44b):

44a. She persisted long after she had <u>any</u> hope at all of succeeding
b. She persisted even when she didn't have <u>any</u> hope of succeeding

In this example we can also see Linebarger's idea that the NPI brings with it the conventional implicature that the NI be stronger than the sentence without the NPI. The original sentence asserts 'P after Q'. The NI is "when P occurred, Q was not the case anymore". Linebarger takes this to "...establish this order more explicitly than the host sentence itself" (p. 371).[9]

And here is another case showing NIs at work. Structure-wise, (45) and (46) are identical, and in both, the comparative clause is in a DE environment.[10] Their only difference is that the events described in the main clause have very different frequencies.

45. Cows fly more often than John <u>lifts a finger</u> to help Louise
46. *The sun rises more often than John <u>lifts a finger</u> to help Louise

The NI of (45) is John never lifts a finger to help Louise. The strengthening requirement is met: If it is the case that 'NOT P' ('It's not the case that he usually helps her'), then 'Q more often than P' follows for Q which never happens. And "given the infrequency of cow flight [(45)] may be used to convey this implicature. But since the sun comes up too frequently to give rise to this implicature, real world facts render the structurally identical [(46)] unacceptable". (p. 377)

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[9] In general, "P after Q" does not directly mean that Q ended when P started, cf. "I used to take the bus to the grocery store after the new bus route opened". So the NI is indeed stronger than the actual sentence in (44).

[10] A quick demonstration that both (45) and (46) are DE in the comparative clause:

(i) a. Cows fly more often than Mary eats <u>beans</u>. →
b. Cows fly more often than Mary eats <u>red kidney beans</u>.

(ii) a. The sun rises more often than Mary eats <u>beans</u>. →
b. The sun rises more often than Mary eats <u>red kidney beans</u>.

Thus Ladusaw's account predicts that in both (45) and (46) lift a finger should be licensed.

And as final example, we look at licensing of NPIs in conditionals. Lakoff 1969 had shown that NPIs are good in conditionals used as threats but not in conditionals used as promises:

47. If you contribute a red cent to those crackpots, I'll never speak to you again
48. *If you contribute a red cent to those crackpots, you'll get yourself a nice tax deduction

The NPI in (47) is licensed due to the NI Either you don't contribute a red cent to those crackpots or I never speak to you again. There is no equivalent NI for 28: Either you don't contribute a red cent to those crackpots or you'll get yourself a nice tax break. So, the threat conditional has a concealed implicated negation of the conditinal clause, but the promise conditional does not.

Another way that NPIs can be licensed in conditionals 'If P, then Q' is if the intention of the speaker is to highlight the possibility for the NI that 'NOT P':

49. If he has ever been there he can tell us about it

And finally, if the NI is contraposition (NOT Q → NOT P)[11]:

50. If he gives a damn about his cat, he'll take it to the vet.

But when NOT P is not intended as a NI, the conditional antecedent cannot license an NPI:

51. If you think John had (*any) fun you should have seen Fred.

This, in a nutshell is Linebarger's account: NPIs are licensed in the immediate scope of negation either in the original sentence, or in its Negative Implicatum (NI).

We will see that many of its ingredients have been inherited by other researchers of NPIs, like, for example, the idea that the use of an NP brings with it a conventional implicature for a stronger sentence. The validity of the ISC is still accepted. Moreover, many researchers, even within the DE view (e.g. von Fintel, Giannakidou 1999, Chierchia 2013) acknowledge that NPI-licensing is subject to pragmatic conditions of the type pointed out by Linebarger. However, the lack of a formal procedure for computing intended negative implicatures has made Linebarger's proposal vulnerable to the criticism that it overgeneralizes, as just about every sentence can be associated with negative implicatures.

There are several differences between Ladusaw's and Linebarger's account, two of which we would like to emphasize: For Ladusaw, negation is just one of the

[11] This one should predict that NPIs are good in the consequent of a conditional as well, contra to fact.

licensing DE environments; for Linebarger, it is the central licensor[12]. The second difference is that Ladusaw's account is semantic, whereas Linebarger's is pragmatic, since it relies on intended implicatures and not logical entailments.

Finally, a primer on scales

While Linebarger does not address the question of why negation licenses NPIs, Ladusaw does attempt to address the question of why DE is relevant for NPI-licensing by appealing to the work of Fauconnier on scales and NPIs. As scales will prove crucial later on, in the remainder of this section we will give some basic background on Fauconnier and scales.

What is a scale and what does it mean to be an endpoint of a scale? "A linguistic scale consists of a set of linguistic alternates, or contrastive expressions of the same grammatical category, which can be arranged in a linear order by degree of their informativeness or semantic strength." (Levinson 1983, p. 133). X is semantically stronger than Y when X entails Y. To illustrate this, take numerals. The expression "I have four children" is semantically stronger than the expression "I have three children", for if I have four children it follows that I also have three children, but not the other way round. This makes three and four elements of the same scale <1, 2, 3, 4, ...>. Similarly, existentials and universals are said to stand in scale relation: <some, every> or <may, must>. These elements are also ordered in terms of strength. "I ate every cookie on the table" entails "I ate some cookie on the table", but not the other way around. And similarly: "I must do the dishes" entails "I may do the dishes", but not the other way around.

Scales can and usually do have multiple elements, and they also have two endpoints, the lowest and the highest. The lowest endpoint of the scale is the element least likely to make a certain proposition true. From this value, it can be pragmatically or semantically inferred that the proposition holds for all the other elements of the scale. Take Fauconnier's example of pragmatic scales associated with the following propositions:

52. John would be polite to X
53. Mary can solve Y

The lower endpoints are the ones from which universal quantification would be conveyed over all the elements of the scale. In the context of (52) a lower endpoint would be 'Josef Stalin' as that would convey that if John would be polite to Stalin, he would be polite just about everybody. The same effect is not achieved if we choose as value for X 'his cousin'. Similarly, in (53) we derive universal quantification if we chose for value of Y 'the hardest problem', but not 'the easiest problem'.

[12] Though she does not say why negation licenses NPIs.

So, if John would be polite to Stalin, there is an implicature that he will be polite to everybody higher than Stalin on the scale, which, if Stalin is the lowest endpoint of the scale, is everybody else. If John would be polite to his cousin, it follows that he would be polite to people higher on the scale than his cousin, but nothing can be concluded about elements lower on the scale. The same holds for solving math problems. If Mary can solve a certain problem, it follows that she can solve easier ones, but nothing follows about harder problems, i.e. problems lower on the scale than the one we know she can solve. In both examples, we derive upward implicatures along the scale: from the truth of the statement for some X on the scale, we assume its truth for all elements higher than X.

For Fauconnier, sentences and their negated counterparts are associated with the same pragmatic scale. While the truth of an affirmative proposition, as we saw, permits upward implicatures, its negated counterpart permits downward implicatures.

That is, in a negated sentence, universal quantification over elements of the scale is brought about when the highest endpoint is picked. As we said before, there is no downward inferences in an affirmative sentence. Sentence (54) says nothing about how Mary would do on harder problems:

54. Mary can solve the easiest problem

However, once negation is introduced, downward implicatures become possible: if (55) is true, it follows that Mary can't solve any of the other (harder) problems on the scale:

55. Mary can't solve the easiest problem.

And, unsurprisingly, upward implicatures are not possible anymore once a sentence is negated. That is, in (56) nothing is entailed about the other (easier) problems on the scale:

56. Mary can't solve the hardest problem.

In short, negation changes the direction in which we compute implicatures. The opposite endpoints turn out to allow most informative inferences in affirmative and negative sentences.

Schmerling 1971 observed that NPIs tend to be low endpoints of scales, and Fauconnier observed that there is a relationship between pragmatic downward entailment (computation of implicatures) and NPI-licensing. Ladusaw takes things further and talks about semantic downward entailment, as we saw.

<u>So…:</u>

In this session we looked at some answers to the question of where NPIs are licensed. As we saw, this is a difficult enough question and it doesn't even begin to

address the question of WHY these environments license NPIs. Neither does it touch upon the question of why certain items are NPIs and not others. That is, how are NPIs constructed and how are they different from other items? We survey the literature on this question next.

B. What makes a Polarity Item a Polarity Item?

We have seen certain accounts of what might be the correct description of the environments that license NPIs. We have not looked at PPIs – items licensed in "positive" environments, but the principles for them are similar (PPIs are generally less discussed than NPIs.)

However, identifying the correct environments does not explain why polarity items (PIs) are licensed there. Moreover, calling something a PI only classifies its behavior and its distribution. It does not explain why it is a PI and how it differs from non-PI items. In recent years, a small number of proposals have appeared that address exactly these questions. In this part of the course we will take a look at those. Most of them address the question of what makes an NPI, and fewer about what makes a PPI. We will focus on the two categories separately.

The construction of NPIs

There are two approaches to the question of what makes an NPI, aligned with the answer to the question of whether the licensing of NPIs is of a syntactic or semantic/pragmatic nature.

The researchers who believe that it is a matter of syntax basically postulate a certain set of features on the PI. These features come with particular requirements to be fulfilled, e.g. checking by negation, and if these requirements are not met, the resulting sentence is ungrammatical. We will call this the "syntactic approach".

For the "semantic/pragmatic" approach on the other hand, NPIs obligatorily introduce alternatives, which need to find their place in the semantic/pragmatic composition of the sentence. A sentence with an NPI comes with certain semantic/pragmatic requirements that need to be fulfilled. If these are not fulfilled, the sentence violates its conditions of use.

The syntactic approach

The tradition that takes NPIs to come along with a syntactic requirement that they be licensed by a (semi-)negative operator goes back to Klima (1964), and has been presented in more modern frameworks by Progovac (1992, 1993, 1994), who takes NPI licensing to be some special instance of syntactic binding, and by Laka (1990), who relates NPIs to the obligatory presence of an affective phrase (SP). Postal (2000), followed by Szabolcsi (2004) introduces a revival of Klima's theory and

claims that NPIs, such as English any, underlyingly carry a negation:

(1) any: [$_D$ NEG [SOME]]

In a negative sentence containing any, the negation moves out of any to a higher position where it is realized as an overt negator.

For example, ¬∃ will surface as:

(2) a. noone if the negation stays in place: I saw noone
b. anyone
i. if the negation raises out: I didn't see anyone
ii. if the negation is deleted by another negative operator:
in No one saw anyone, the negation on the subject "eats up" the negation in the object.

Den Dikken (2004) adopts the essence of Postal's analysis, but recasts it within terms proposed by Chomsky (1995 etc): some[13] NPIs carry an uninterpretable negative feature that must be checked against a negative head in the clause. Independently, and for different reasons, van de Koot and Neeleman (2002) and Herburger and Mauck (2007) reached this conclusion as well.

The main difficulty that such purely syntactic approaches face is to understand why most types of NPIs frequently have very particular semantics, namely denoting the endpoint of a scale, e.g. lift a finger, have a red cent. If being an NPI is merely a matter of having certain syntactic features, then we would expect a more random distribution of NPIs, and not the observed higher concentration within the class of scalar items.

Herburger and Mauck (2007) are aware of this problem and try to countenance it by arguing that the scalar endpoint property is a necessary, but not a sufficient condition for NPI licensing. Their approach is more nuanced than others' within the syntactic camp: it is indeed a pragmatic and/or semantic issue whether some element may be a candidate for becoming an NPI, but it is only the presence of some uninterpretable negative feature that turns an element into an NPI.

Even so, two problems still remain. The first problem concerns the licensing of NPIs by Downward Entailing (DE) determiners. For Postal, this means that an NPI-licensing expression, such as few, must contain an underlying (incorporated) negation. Under the feature checking analysis few must contain some negative feature that checks the negative feature of the NPI. However, it is unclear what determines the distribution of negative features to non-negative elements. Not every semi-negative element can license NPIs (e.g. it is bad that.... can't, but it is regrettable that... can)

A second problem, especially for feature-checking approaches, is that the

[13] Den Dikken actually claims that there are two types of NPIs: those that carry a negative feature and 'plain NPIs' which just have the property that they need to be licensed by a DE/non-veridical operator at LF. In other words, he has both syntactic and pragmatic/semantic licensing, for different kinds on NPIs.

locality restrictions on NPI licensing appear to be weaker than those for regular feature checking. For instance, NPIs can be licensed across the boundaries of a clause, even across an island, in fact, which is not possible for the more established varieties of feature checking.

(3) a. I didn't say that Mary bought any cookies
b. I don't work in order to make any money

The semantic approach

The first ones to seek for a purely semantic/pragmatic explanation as to why NPIs are sensitive to their licensing requirements are Kadmon & Landman (1993). For them, NPIs such as English any semantically differ from plain indefinites like a in being domain-wideners; according to KL, they extend the domain of reference beyond the contextual restrictions that plain indefinites are subject to. Take (4), which contains Kadmon and Landman's original examples:

(4) a. I don't have potatoes
b. I don't have any potatoes

Whereas (4a) says that in a particular domain, the speaker doesn't have potatoes, (4b) is said to suggest that the speaker doesn't even have a single old potato in some corner in the kitchen.[14]

The second step in Kadmon and Landman's line of reasoning is their Strengthening Condition. According to this, uttering an NPI instead of a plain indefinite should strengthen the sentence. For KL this means that the sentence with the NPI must be more informative[15] than the sentence with a plain indefinite. Since (4b) is stronger than (4a), this strengthening condition is met: the set of situations where I don't have some potatoes (e.g., suitable to make a good potato-leek soup) is larger than the set of situations where I don't have any potatoes whatsoever.

But if we take away the negation from (4), the semantic strength relations reverse. (5a) is true in more situations than (5b) is, as even old rotten potatoes forgotten in a kitchen corner will do to make it true.

(5) a. I have any potatoes
b. I have potatoes

And this means that (5a) is weaker than (5b). This, in turn, means that the strengthening requirement that the sentence with the NPI be stronger than the one

[14] Thus the use of NPIs under KL is always relational, in the sense that they mark widening with respect to another, alternative sentence.
[15] What is meant by "more informative" is "true in a subset of the situations". It is the same notion as asymmetric entailment and "semantic strength" (see the previous handout, primer on scales).

without it is not met. Therefore, the NPI is not licensed, and (5a) is not a good sentence.

Kadmon & Landman's approach has been criticized for two reasons (cf. Krifka 1995, Giannakidou 2011): first, it is very hard to determine whether items like any are indeed domain wideners or not; that is, it is very hard to determine whether (5b) is indeed stronger than (5a). Second, the strengthening requirement, for Kadmon & Landman, is a pragmatic requirement. But it is not clear what enforces this requirement.

Another denizen of the semantic approach is Krifka 1995. Krifka continues the KL idea that unlicensed NPIs violate their conditions of use. However, he also departs from them in several ways. First, Krifka replaces KL's notion that NPIs are domain wideners by the notion that NPIs denote the lowest endpoint of scales. Second, KL's suggestion that the sentence with the NPI be stronger than the one without it (a requirement whose source was unclear) is superseded by a more general pragmatic principle, based on Grice's Maxim of Quality. Krifka incorporates the pragmatic workings of this Maxim in the case of scalar sentences into an operator called Scal.Assert. Applied to a sentence with a scalar item, the operator essentially says that all stronger propositions along the same scale are false. The principle captured by the operator is not specific to NPIs, unlike KL's Strengthening Condition. Yet together with the assumption that NPIs denote lowest points on their scales, this general principle makes a specific condition on strengthening unnecessary. Let's see how his system works. Take the following sentence where an NPI is unacceptable:

(6) *Mary saw anything

(6) asserts that there is a thing that Mary saw. At the same time, as anything is a scalar item denoting an endpoint on its scale, the operator Scal.Assert, which necessarily applies to the sentence, computes the implicature that any scalarly stronger proposition is false. Examples of such stronger propositions include the ones in (7).

(7) a. Mary saw Bill
b. Mary saw a car
c. Mary saw a red thing.

So in the end, (6) literally says that Mary saw something, but it is also computed that for any particular kind of thing, Mary did not see it. This is a contradiction. And a contradictory sentence is unassertable, according to another general pragmatic principle (due to Stalnaker 1972). This is why, for Krifka, (6) is bad: it is not that (6) is ungrammatical, it is a sentence that can never be uttered felcitously.

Why does anything in (6) become good under negation (or any other downward entailing operator)?

(8) Mary didn't see anything

(8) is very strong. It is stronger than all of its alternatives, some of which are listed in (9):

(9) a. Mary didn't see Bill
b. Mary didn't see a car
c. Mary didn't see a red thing

All of them are already entailed by the literal meaning of (8). So there is nothing for Scal.Assert to compute, and no contradiction is yielded in (8).

Krifka's approach had been criticized on the basis that other known scalar implicatures that fall under Grice's Maxim of Quality are cancellable. For example:

(10) a. You get a tax refund if you have 4 children. Peter has 4 children, so he'll get a refund. In fact, he has 6 children.
b. Mary charmed some boy at the party. In fact, she charmed every boy at the party.

In (10a), Scal.Assert yields that any stronger proposition like "Peter has 5 children", "Peter has 6 children", and so forth, must be false. Yet it is possible to cancel that implicature explicitly, adding "In fact, he has 6". Similarly, in (10b), the first sentence implicates that though Mary charmed some boy, she did not charm every boy. But the second sentence can overrule the implicature.

But for Krifka's account of NPIs to work, the implicatures computed for (6) negating all sentences like the ones in (7) must be uncancellable, even though they are computed by the same general pragmatic mechanism. If (6) behaved as (10), we would expect the following mini-discourse to be OK:

(11) Mary saw anything. In fact, she saw a car.

Furthermore, it is unclear how NPIs like any are to be distinguished from plain indefinite determiners like a or some.[16] These are also endpoints of scales but they are fine in positive environments. For Krifka, the difference between the two kind of indefinites is merely stipulated: he says that any "introduces alternatives", while a[17] does not, but no deeper explanation of why that would be so is given.

Bridging the syntactic and semantic approaches

Chierchia (2006, 2013) takes elements from both the syntactic and the semantic approach. What Chierchia takes from the semantic approach (from Krifka,

[16] Krifka actually argues that some is not a PPI, contra to appearances and a commonly held belief. It is not that Krifka does not allow for any PPIs, though: he argues there are genuine PPIs, for instance, the adverb rather.
[17] Krifka does not explicitly discuss a, so we just assume he would have the same account for it as he has for some.

specifically) is the idea that a sentence with an unlicensed NPI is bad because what it asserts is in contradiction with the falsity of all stronger alternatives of the sentence with the NPI. For Krifka, this was the result of the application of Scal.Assert representing the application of a general pragmatic principle. For Chierchia, it is the result of a particular uninterpretable feature ([+σ]), which is present on all NPIs. This feature [+σ] must be checked by a σ operator and σ operators are abstract exhaustifying operators. Exhaustifying operators rule out all stronger alternatives.[18] In other words, Chierchia derives the desired result of all stronger alternatives having to be false from the (morpho-)syntax of a sentence containing an NPI. And this appeal to syntactic features is what places him also in the syntactic approach.

Let us see how Chierchia's system works. The representations underlying the examples in (4a) and (4b) containing an NPI are:

(12)	a.	EXHAUST[+σ]	I don't have	any[+σ]	potatoes
	bi.		I have	any[+σ]	potatoes
	bii.	EXHAUST[+σ]	I have	any[+σ]	potatoes

As we said above, the presence of a strengthening operator is forced by the syntax: leaving the abstract strengthener out would leave the NPI's [+σ] feature unchecked.

(12a) is fine because:

i. the [+σ] feature has been checked and
ii. the meaning of the sentence ("I have no potatoes") is already the strongest alternative possible and can therefore not be contradicted by any stronger alternatives.

Matters for (12b), on the other hand, are different. If there is no EXHAUST operator, as in (12bi), then the feature [+σ] is left unchecked, and we have a syntactic crash. Furthermore, in (12bii), the feature [+σ] is checked just like it was in (11a); in other words (i) also holds for (12bii). However, there are problems with the equivalent of (ii). (12bii) asserts that I have a potato but it also asserts that all stronger alternative propositions ("I have an old potato", "I have a young potato") are false.[19] Along the lines of Krifka (see later for the exact treatment), (12bii) is then out because it yields a contradiction. If all these alternatives are false, then I should have no potato at all, which is in contradiction with the first statement.

Chierchia's approach fares better than Krifka's in that the exhaustification is part of syntactic encoding and hence not cancellable. For Krifka, recall, exhaustification is an implicature, which we ought to have expected to be cancellable, contra to fact. By appealing to a special syntactic feature present only on

[18] Just like focus-sensitive operators, such as only or even.

[19] Note that this is an assertion that is derived by a syntactically present operator EXHAUST for Chierchia, whereas it was an implicature derived by a pragmatic mechanism for Krifka.

NPIs, Chierchia also explains why this uncancellability is not observed for all scalar items.[20]

In truth, though, Chierchia's solution to the lack-of–cancellability problem is brute force. Chierchia is aware of this and defends his approach by appealing to exhaustification brought in by syntactic features in other environments, such as answers to questions or embedded implicatures. However, Chierchia claims that exhaustification in answers or embedded sentences is the result of syntactic features is hardly uncontroversial itself.

What is the difference between any and a for Chierchia?[21] Chierchia takes both elements to induce scales, that is, obligatorily introduce alternatives. To have the ability to introduce alternatives is captured by his [+σ] feature. The determiner any always carries [+σ], the determiner a does so optionally.

Furthermore, Chierchia, following Fox (2006), argues that there are two ways of thinking of alternatives. There are scalar alternatives and domain alternatives. For instance, the determiner a, when it has [+σ], forms the lowest element of a scale {a, every}, which makes "every" a scalar alternative of "a". This can be seen in (13), which may come with an implicature that I didn't read every book:

(13) I read a book

We call these "scalar alternatives". However, alternatives can be introduced along a different dimension as well. Uttering (13) in different contexts leads to different interpretations of the domain of quantification of "a book". For instance, in a linguistic context, it may be understood as referring to the set of linguistic books, whereas in other contexts it may refer to any book there is in the world. Since the former is a subset of the latter, the first domain of quantification can be thought of as a subdomain of the latter. Chierchia takes subdomains to be possible alternatives to quantificational expressions too. So these are the "domain alternatives".[22]

Going back to a versus any, we already saw that one difference between these two items is that any obligatorily has [+σ], but a only optionally so. But there is one more difference between them, according to Chierchia. The determiner any

[20] Both Chierchia and Krifka have to stipulate something special about NPIs as opposed to other expressions with the similar meaning. The difference is just that Chierchia stipulates the presence of a syntactic feature, and Krifka, being an alternative inducer. So in this respect, it is not that Chierchia is more stipulative than Krifka.

[21] Recall that for Kadmon and Landman the answer is that any is a compulsive domain-widener. This means that the presence of the NPI needs to make a stronger statement than the one without it and that when this pragmatic condition is not fulfilled, the sentence is out. For Krifka, a is not an alternative inducer, while any is.

[22] Domain alternatives are also scalar as there are entailment relations between them, but these entailments are structured in a more complex way.

always introduces domain alternatives in addition to scalar alternatives. The determiner a may introduce domain alternatives, in addition to scalar alternatives but doesn't have to.

So here is what we have:

Table 1

	Scalar alternatives	No scalar alternatives
Domain alternatives	Any, a	
No domain alternatives	a	a

This shows that a can be found in three different guises: not introducing any alternatives (14a), introducing scalar alternatives only (14b) and introducing both scalar and domain alternatives (14c).

(14) a. I read a book, in fact I read all the books
b. I read a book, but I didn't read every book
c. I didn't read a book, not even the ones that my mother explicitly told me to read

This has as result that a is fine in positive contexts. It does not need to be strengthened and even if it would, it would only introduce scalar alternatives, yielding a reading where (1) means " I read a book but not every book".

Now let's look at (15):

(15) *I read any book

In (15) any introduces scalar and domain alternatives. Moreover, any's [+σ] feature invokes an exhaustification operator. This exhaustifictaion operator is "unselective" in that it applies both to scalar and domain alternatives. This has as result that all stronger propositions containing scalar alternatives and all propositions containing domain alternatives are false. And this, in turn, leads to the problematic contradiction that makes (15) bad. Suppose there are three books in the world: a blue book, a green book and a red book. Then (15) asserts that I read a blue, a green or a red book. But since {blue book, green book} is a subdomain of the domain of quantification of any book it must be introduced as an alternative to any book. Now "I read a blue or a green book" is a stronger sentence than "I read a blue, a green or a red book" (as it is true in fewer situations). Therefore, the obligatory exhaustification makes it so that (15) also asserts that I did not read a blue or a green book. And since {blue book}, {green book} and {red book} are subdomains of "any book" as well, (15) also means that "I didn't read a blue book" and "I didn't read a green book" and "I didn't read a red book". But if all these three statements are true, they contradict the basic assertion of (15), namely I read a blue, a green or a

red book.

We already said that Chierchia avoids the lack-of-cancellability problem that Krifka faced by grammaticizing the implicature. This is what we referred to as the brute force solution to the problem (namely, the introduction of [σ]). But here we see one more difference between the two accounts: the introduction of two types of alternatives. Importing Fox's idea that there are two types of alternatives permits him an attempt at making the difference between a and any more pronounced than just saying that one induces alternatives, while the other does not, as Krifka does.

A possible worry for Chierchia's account here may be that by postulating two independent differences between a and any (namely obligatory presence of [σ] and obligatory introduction of domain alternatives), four different types of minimally differing lexical items are predicted, as can be seen in Table 1. Apart from any (obligatory [+σ] and obligatory introduction of domain alternatives) and a (optional [+σ] and optional introduction of domain alternatives), there are such possibilities predicted to exist as, for instance, items that have obligatory [+σ] but only optionally introduce domain alternatives, and those that have an optional [+σ] while obligatory introducing domain alternatives when scalar alternatives are introduced. However, no clear examples of such elements have been attested.