Chapter 42

Negation and negative polarity items in Slavic

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This chapter describes the Slavic expressions dependent on negation. It summarizes three approaches to such expressions which appeared in the history of formal linguistic Slavistics. First, syntactic analysis of negative dependent expressions (see Progovac 1994 a.o.) is discussed, next the semantic approach of Błaszczak 2001, and last, the pragmatic stance of Crnič 2011 is introduced. The chapter shows how Slavic data of this kind were important from the point of view of formal linguistics, and their description mirrored the changes in the general linguistic theories.

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1 Introduction

Negation and negative dependent or sensitive expressions belong to the core grammatical constructions of natural languages. There are no known languages that would lack expressive means to communicate negation (see Bernini & Ramat 2012 a.o., where the fact of negation being present in all natural languages is called a "pragmatic universal"). Slavic languages are not different, of course. So there is a plethora of phenomena (many of them already described by formal linguists) concerning negation which are perfect candidates for inclusion into this chapter. But of course, space and other limitations force me to narrow down the domain described in the present chapter (but see Horn 1989 for the book aiming at the description of all linguistic things connected to negation). So I will limit myself to discussing various types of Slavic negative dependent expressions. And

I will only mention many valuable contributions which would surely deserve appropriate space but which are beyond the horizon of negative dependent expressions. Nevertheless, see §3 for at least some pointers to literature discussing the topics which do not appear in this chapter.

Criteria for delimiting this chapter to Slavic negative dependent expressions were as follows. I wanted to summarize such areas of Slavic negation where (i) Slavic linguistics contributed to general linguistics theories (even if now the particular approach seems to be more of a historical value) and (ii) where Slavic data, and more specifically expressions interacting with negation or which in some respect are negative themselves offer insights valuable from a typological perspective. And it seems more than reasonable that Slavic negative dependent expressions (especially negative polarity items) pass both criteria.

First, the obvious thing to note is that Slavic languages do offer much more expressivity than the (still) most studied language, English. Consider the all-time favorite English polarity expression *any* (other types of English polarity expressions like *even one* will be discussed in the section §2.3). In the following English example, *any* is licensed by clause-mate negation (1a), adversative predicate (1b) (which I, for expository reasons, treat as containing negation but see §2.2.1 for more details of adversative predicates) and, finally, by a possibility modal (1c). In (1a) and (1b) *any* is usually considered as a NEGATIVE POLARITY ITEM (NPI), and the example like (1c) as FREE CHOICE ITEM (FCI). Although it seems typologically more frequent (than the opposite pattern) that one item (like English *any*) acts both as the NPI and the FCI, it is not a rule.[1] For the sake of exposition, let us assume that at least in English, *any* is an item with roughly existential semantics, and such a polarity item can be described by a unified theory.[2] Be it as it may, NPI and FCI are united by a licensing requirement. In all three cases, the scope of the existential NPI/FCI must be narrow relative to the scope of negation or existential modal. And, of course, the use of NPIs/FCIs leads to ungrammaticality without embedding in an appropriate environment: (2). Negative polarity items are the main topic of this chapter, and as an avid reader most probably knows, they are the class of negative dependent expressions which are usually discussed (at least by semanticists) the most, since their distribution can be very

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[1]See Horn (1972) and Haspelmath (1997) for an early observation and a typologically broader picture, respectively. As one of the anonymous reviewers correctly points out, languages like Latin, Romanian, and Russian are clear examples of distinguishing FCIs from NPIs series.

[2]Nowadays, this seems like a standard approach, following Carlson (1980) and then Kadmon & Landman (1993), but at least for FCIs a universal quantifier analysis was offered by Dayal (1998); a.o. Thanks to all three reviewers for reminding me of the importance of *any* in research history.

well-expressed in terms of entailment and other related properties of the sentences where they occur. A more formal characterization will be introduced in §2.1.

(1)   a.   Peter didn't visit anyone.
    i.   ¬ > ∃
    ii. # ∃ > ¬

  b.   John refused any help.
    i.   ¬ACCEPT > ∃
    ii. # ∃ > ¬ACCEPT

  c.   You can take any card from the deck.
    i.   ◊ > ∃
    ii. # ∃ > ◊

(2)   #Peter visited any student.

Compare this with the Czech translation of the three environments showing the grammatical but also ungrammatical possibilities of three types of negative dependent expressions (which still is a subset of possible expressions in various ways interacting with negation, see the section §2.3 for more details).

(3)   a.   Petr nenavštívil {ani   jednoho / #byť jediného / #jakéhokoliv}
        Petr neg.visited   even one   just one   any
        studenta.
        student.
        (Intended:) 'Peter didn't visit {even one / a single / any} student.'

  b.   Petr odmítl   {jakoukoliv pomoc / #ani   jednoho studenta / pohnout
        Petr refused   any   help   even one student   move
        se   byť o   jediný centimetr}.
        REFL just by one   centimeter
        (Intended:) 'Petr refused {any help / any student / to budge an inch}.'

  c.   Můžeš   si   vzít {jakoukoliv kartu / #byť jedinou kartu / #ani
        can.2SG REFL take any   card   just one card   even
        jednu kartu}.
        one   card
        'You can take {any card / even a single / not even one card}.'

                                                                    (Czech)

The negative dependent expressions in Slavic come in many forms. Some seem to be vanilla NPIs but are limited to clause-mate negation (like *ani* in (3)). Others bear presuppositions of unlikelihood (as *byť jediný* in (3), which resembles English NPIs like *even one*), and yet others seem to prefer free choice contexts (as *jakýkoliv* from (3)). The variation of Czech (and generally Slavic NPIs) is reflected in the patterns of their distribution. Or, to put it the other way round: the flavors of NPIs determine in which contexts we can find them, and the varieties of Slavic polarity items carve up the landscape in a different way from the more usually discussed Romance or Greek polarity expression (see Laka 1990; Giannakidou 1997; a.o.).

When looking at the history of approaches to Slavic negative dependent expressions, we can clearly distinguish three types of theories: (i) syntactic theories of NPIs (discussed in §2.1), (ii) semantic theories (§2.2), (iii) pragmatic theories (§2.3). The particular details of each approach will be discussed in the respective sections. But what all of them are united by is the observation about the richness of Slavic expressions, which offers a much clearer picture than the sparse English *any*. Moreover, the various subsystems of negative dependent expressions create beautifully intricate territories where individual subtypes compete for insertion. Consequently, their accurate description brings new data not only for the polarity agenda but also for our understanding of concurrence in grammar. In summary, various approaches to Slavic NPIs will be the main topics of the current chapter, simply because they were at the center of attention in the last 30 years of formal Slavic linguistics.

But before we begin, let us quickly address a closely related phenomenon which I will describe just briefly in the current article (see Dočekal 2019 for full description). Next, to semantically dependent expressions, NPIs exemplified above, there are (in all Slavic languages) negative dependent expressions, so-called NEG-WORDS. Neg-words are at least in current standard semantic theories described as syntactically, not semantically dependent. The theoretical distinction (neg-words: syntax, NPIs: semantics) is operationalized via the following criterion from Giannakidou & Zeijlstra (2017):

(4) X qualifies as an neg-word iff:
    a. X can be used with structures with sentential negation or other X with meaning equivalent to ¬;
    b. X provides a negative fragment answer.

Especially the second part of the criterion is the most reliable diagnostic to distinguish NPIs from neg-words because neither of the 3 types of NPIs in (3) can be

used as a fragmentary answer to a question. See (5B₁), where all three NPIs are unacceptable, contrasting with the acceptability of the neg-words in the same context, see (5B₂).

(5)   A: Kdo byl dneska večer   na náměstí?
         who was today   evening on square?
         'Who was today in the evening on the square?'

     B₁: #{Ani jeden člověk. / Byť jediný člověk. / Kdokoliv.}   NPIs
         even one human just one   human anyone
         Intended: '{Not even one man / not a single man / Anyone }.'

     B₂: Ni-kdo.   neg-word
         neg-body
         'Nobody.'

It is important to notice that both the syntactic approach of Progovac (1994) and the semantic approach of Błaszczak (2001) discussed in §2.1 and §2.2 respectively do not accept the distinction between neg-words and NPIs as delineated above. And it is one of the problems which caused both empirical and theoretical flaws in both approaches. But to be fair, both approaches were published before there was a solid framework for the treatment of neg-words in negative concord languages (Zeijlstra 2004). Moreover, either syntactic treatment of all NPIs as in Progovac (1993) or fully semantic treatment of neg-words (and their sub-kinds as neg-pronouns) as in Błaszczak (2001) were compatible with the linguistic state of art valid in the time of their publication.

During this chapter, I will use the following terminology, which is based partially on Błaszczak (2001) and exemplified with Czech examples in (6).

(6)   a. NEG-WORDS
        nikdo 'nobody' (glossed as neg-body), *nic* 'nothing' (neg-thing), *nikde* 'nowhere' (neg-place)

    b. A-NPIs
       ani jeden 'not even one' (NPI-one), *ani jednou* 'not even once' (NPI-once)

    c. K-PRONOUNS
       kdokoliv 'anyone', *kdekoliv* 'anywhere', *cokoliv* 'anything'

    d. B-NPIs
       byť jediný (glossed depending on context 'even one' or 'at least one'), *byť jednou* ('even/at least once')

    e. REGULAR (WEAK) NPIs
       as Czech *vůbec* 'at all'

2 Three types of approaches to NPIs (from the Slavic perspective)

2.1 Syntactic approach of Progovac

Let us first start with the syntactic approach of Progovac (1994) (and some elaborations like Progovac 2005 or for a compatible approach to PPIs see Szabolcsi 2004). Progovac's (1993) approach is partially inspired by the influential work of Linebarger (1987) where some serious problems of early semantic approaches (like Fauconnier 1978; 1980; Ladusaw 1979) to NPIs were recognized. The syntactic theory of NPI licensing claims that the domains and licensors of NPIs should be described by syntactic rules: either via transformational like in the earlier approaches of Klima (1964) or via binding type as in Progovac's work.

Progovac's work should be understood with the 80's semantic theory of NPIs as a background. In the 80s, the semantic theory of NPIs, in a nutshell, claimed that NPIs occur in DOWNWARD ENTAILING contexts. Downward entailing contexts are such where speakers can reason from sets to subsets (see §2.2 for more details). Let us see this more clearly on an example: consider an example of a downward entailing context in (7b) as opposed to an UPWARD ENTAILING context in (7c) (and note the subset–superset relationship in (7a)). In (7a), the quantifier *every* allows one to draw an inference about the truth of the predicate to all subsets of dogs. The inference is valid only for the first argument of *every* (natural language quantifiers have two arguments like their formalization in predicate logic with λ-abstraction, $\lambda P \lambda Q \forall x[P(x) \rightarrow Q(x)]$), since from the truth of *Every dog barks* it doesn't follow that *Every dog barks loudly*. On the other hand, a quantifier like *some* in (7c) allows inferences about the truth of the predicate from subsets (e.g., *dachshund*) to supersets (*dogs*), in both its arguments. The quantifier *every* is then called downward entailing (in its first argument) and *some* upward entailing (in both arguments). The quantifier *every* is downward entailing, and because of that (in semantic theories of NPIs), it licenses NPIs: (7d) while upward entailing quantifier *some* does not: (7e). Quantifiers like *every* and *some* are then called downward and upward monotonic, respectively, since they are monotonic in the same sense as monotonically increasing or decreasing functions in mathematics.

(7)   a.   dachshund ⊆ dog
      b.   Every dog barks. ⊨ Every dachshund barks.
      c.   Some dogs barks. ⊭ Some dachshunds bark.
      d.   Every dog which won any medal barked.

 e. *Some dogs which won any medal barked.

The semantic approach works in simple cases like (7d), but in its basic form, it has many drawbacks. One of the first influential critiques is Linebarger (1987), who noticed some serious problems with the semantic approach. First, Linebarger correctly pointed out that many NPI licensing contexts are not, in fact, downward entailing. Her examples involved conditionals and adversative predicates; see §2.2.1 for more details and refinement of the semantic approach, which can deal with the majority of such problems. And her second line of attack concerned locality restrictions between the licensors and their NPIs. One example like that is in (8a). The example cannot have the reading (8b): it is not true that Mary wears earrings to every party (to some yes but not to all) but only has the reading in (8c): there are no such earrings that Mary wears to every party. According to Linebarger, this shows that some scopal (maybe syntactic) locality constraint (requiring the NPI to be in the immediate scope of its licensor) is needed. This seems to be a valid objection that cannot be explained by some a theory of NPI licensing depending only on the monotonicity of its context. But see Chierchia (2013) for a modern pragmatic/semantic framework that covers even these supposedly syntactic locality problems.

(8) a. Mary didn't wear any earrings to every party.
  b. $\#\neg\forall y[\textsc{party}(y) \rightarrow \exists x[\textsc{earring}(x) \wedge \textsc{wear at}(\textsc{Mary}, x, y)]]$
  c. $\neg\exists x[\textsc{earrings}(x) \wedge \forall y[\textsc{party}(y) \rightarrow \textsc{wear at}(\textsc{Mary}, x, y)]]$

It is appropriate to understand Progovac (1993) on the background of (in its time very important and influential) Linebarger's (1987) theory. Progovac bases her analysis in syntax, trying to explain NPI properties from the principles of binding theory but applied to various types of NPIs instead of the standard pronouns and anaphors. Next, Progovac (1993) was very influential in its time and still is one of few systematic analyses of Slavic NPI data. Moreover, the whole analysis does not cover only Slavic languages but also provides a general framework designed for a typologically diverse sample of languages. But let us begin with empirical claims. Progovac distinguishes three classes of polarity-sensitive expressions and claims that there are two NPI licensors: negation and an operator in Comp.[3] The polarity operator is licensed either by syntactic movement or

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[3]With Comp I refer to complementizers, the functional category exemplified with English *that* or *whether*. Complementizers are heads of embedded clauses (CPs).

by DE predicate/operator from a c-commanding clause.[4] Progovac brings data from Bosnian/Croatian/Serbian (BCS). Nevertheless, her analysis is meant for all Slavic languages. And it is true that in the majority of Slavic languages, similar data can be found (see §2.2 for analogous data from Polish, described in a different framework, though). According to Progovac (from the NPI point of view), we should distinguish the following three classes of expressions:

1. BCS pronouns which begin with the negative prefix *ni*, e.g., *ni-(t)-ko* 'no one', *ništa* 'nothing', *nikud* 'nowhere' are NPIs, in our terminology neg-pronouns. Progovac, following Laka (1990), claimed that neg-words in natural languages with negative concord should be analyzed as NPIs, which is one of the possible positions but definitely not the only one (see §1). Neg-pronouns are claimed to be anaphoric, subject to Principle A: they have to be bound by negation in their governing category. Data supporting anaphoric nature of NPIs are in (9),(10). Grammaticality/ungrammaticality of examples like (9)/(10) is then simply accounted as syntax locality licensing or, more specifically, as a failure to find an antecedent that would be local enough.[5]

   (9) Milan *(ne) vidi *ni-šta.*
       Milan   not sees neg-thing
       'Milan cannot see anything.'   (BCS; Progovac 1994: 41)

   (10) * Milan ne tvrdi [da Marija poznaje *ni(t)-koga*].
        Milan not claims that Mary knows no-one.ACC
        Intended: 'Milan doesn't claim that Mary knows anyone.'
                                                   (BCS; Progovac 1994: 41)

2. Progovac further claims that another class of BCS pronouns, beginning with the prefix *i*, e.g., *i-(t)-ko* 'anyone', *išta* 'anything', *ikud* 'anywhere', and the like are polarity items as well, in our terminology k-pronouns. K-pronouns are, according to Progovac, anaphoric pronominals. They are subject to Principle B: they need to be free in the local clause but bound in

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[4]What falls under syntactic movement is the licencing of NPIs in questions, conditionals, and some other constructions where inversion or movement can license the existence of the polarity operator in Comp.

[5]In Slavic languages, the local domain for the majority of anaphors (governed by Principle A) is a tensed clause, TP. See Büring 2005 for a good textbook on Binding Theory, which also discusses cross-linguistic data.

the sentence (licensed from a higher position) – after Progovac (1994: 64). Environments allowing only k-pronouns, not neg-words, are (according to Progovac): questions, conditionals, adversative predicates, restrictive clauses of universal quantifiers, and superordinate negation. For all these environments, she offers a syntactic explanation of the possible occurrence of k-pronouns (and the impossibility of neg-words): operator in Comp (in all five environments) is supposed to license k-pronouns but is too non-local for neg-words. Some examples (after Progovac 1994) are shown in (11), the explanation is the same for them all (but see Progovac 1994: 64 for a full range of examples).

(11) a. Da li Milan voli *i(t)ko-ga*   / **ni(t)-koga*?
          that Q Milan loves anyone.ACC   no-one.ACC
          (Intended:) 'Does Milan love anyone?'

     b. Akor Milan povredi *i(t)koga*   / **ni(t)-koga*, bi-će kažnjen.
          if   Milan hurts anyone.ACC   no-one.ACC be.FUT punished
          (Intended:) 'If Milan hurts anyone, he will be punished.'

     c. Sumnja-m da   Milan voli *i(t)koga*   / **ni-(t)koga*.
          doubt.1.SG that Milan loves anyone.ACC   no-one.ACC
          'I doubt that Milan loves anyone.'

     d. Svako   (t)ko povredi *i(t)koga*   / **ni(t)-koga*, mora bit
          everyone who injures anyone.ACC   no-one.ACC must be
          kažnjen.
          punished
          'Everyone who injures anyone must be punished.'

(BCS; Progovac 1994)

3. Finally, Progovac analyzes BCS pronouns beginning with the prefix *ne*, e.g., *ne-(t)-ko* 'someone,' *nešto* 'something' as POSITIVE POLARITY ITEMS (PPIs). PPIs (*ne(t)ko, nešto*, etc.) are according to her pronominals (in the sense of binding theory). They are subject to Principle B and have to be free in their governing category. Data supporting PPI analysis of *ne* pronouns come from the grammaticality of these pronouns in positive sentences. Their ability to occur in the scope of superordinate negation and their possible narrow scope (added formalization, MD) with respect to a superordinate negation but their obligatory wider scope than their clausemate negation, after Progovac (1994).

(12) Milan je uvredio ne(t)ko-ga.
Milan is insulted someone.ACC
'Milan has insulted someone.'

(13) a. Marija ne smatra da je Milan uvrdio ne(t)koga.
Mary not thinks that has Milan insulted someone
'Mary does not think that Milan insulted someone.'

b. $\neg\text{THINK}(\text{MARY}, p) \wedge p = \exists x[\text{PERSON}(x) \wedge \text{INSULTED}(\text{MILAN}, x)]$

(14) a. Ne(t)ko nije došao.
someone not-is come
'someone has not come.'

b. i. Available: $\exists x[\text{PERSON}(x) \wedge \neg\text{COME}(x)]$
ii. Unavailable: $\neg\exists x[\text{PERSON}(x) \wedge \text{COME}(x)]$

To take stock: Progovac analyzes three classes of BCS expressions: neg-words, k-pronouns, and indefinite pronouns. She explains their various polarity sensitivity as a syntactic phenomenon: basically as a need of an expression to be bound either locally (neg-words) or non-locally (k-pronouns). In the third case (indefinite pronouns) as an obligation to be free locally (indefinite pronouns must be locally free but might be bound out of their governing category). The negation acts as a binder for the first (and to some extent second class). The operator in Comp is the long-distance binder for the second class; she offers a similar analysis for English, though with parametric changes.

Progovac distinguishes only two classes of English expressions: (i) PPIs and (ii) NPIs. The items she considers uncontroversial PPIs for English are *some* or the temporal adverbial *already*. English PPIs (analogically to Slavic data discussed above) have to be locally free (Principle B). NPIs, like *any*, have to be bound locally (Principle A). There is an obvious difference between *any* and *ni-* BCS pronouns – *any* can be licensed across the clausal boundary (either by negation or by another DE operator). Such possibility to be licensed non-locally (against Principle A) is, according to Progovac, the result of a language variation: English-type of NPIs can raise at LF, BCS NPIs cannot.

For English then, Progovac predicts that *any* can be bound either by a clause-mate negation: (15a) or by an OP licensed from, e.g., a root clause with predicates that are not upward-entailing: (15b) – *be sorry* is a downward entailing predicate: if you are sorry that people kill animals, you are sorry that people kill pigs. This

is not possible for Slavic neg-words since they cannot raise at LF; their clause-mate negation must license them. English-type NPIs cannot be licensed only in a clause without negation and with a verb which is upward entailing like (15c); if you forgot keys, you forgot an object but not the other way round.[6] This all is correct and seems like a beautiful cross-linguistically sensitive syntactic theory of NPIs.[7]

(15)   a.   Peter didn't write any letter.
       b.   Peter is sorry that he said anything.
       c. * Peter forgot anything.

But there are some problems. Progovac's approach predicts (as correctly pointed out already by Krifka 1995: 212–213) that the English-type NPI can never be licensed in the non-clausal argument of a non-negated root clause (which works as an explanation of the ungrammaticality of (15c)). There is no Comp for an operator in the root clause, and there is no negation to license it either. But this prediction is wrong both for English and for Slavic languages. Consider the English example from Krifka (1995: 213), which was later modified by Błasczak (2001) to show that Slavic-type NPIs (neg-words) can be licensed without any proper syntactic licensor in Progovac's sense, (16a). The same point can be made for k-pronouns as well: they are licensed by adversative predicates, usually licensing NPIs; see the naturally-sounding Czech example in (17). (17) is a positive root sentence, so according to Progovac's approach, the k-pronoun should be free in this domain. Nevertheless, it is precisely the main predicate of the sentence, which allows the grammaticality of the k-pronoun. But if the predicate is the licensor here, we have a Principle B violation pace Progovac (1993). At least in Czech, the set of predicates that license k-pronouns by themselves seems to

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[6]I follow here Krifka (1995) and his slightly Janus-face approach to *forget*: for Krifka, the clausal argument of *forget* is (at least) not upward entailing since "If Mary forgot that a woman came yesterday, she might not have forgotten that a person came yesterday" (Krifka 1995: 212), but the NP argument of *forget* is upward entailing since "if Mary forgot a poem by Goethe, then she forgot a poem, but not necessarily vice versa" (Ibidem). That explains correctly why NPIs in the clausal arguments of *forget* are licensed (*I forgot to bring anything*), unlike in (15c). But this simply seems like a restatement of NPI licensing behavior in terms *forget*'s entailment profile, as one of the anonymous reviewers correctly remarks. It would be best to thoroughly test NPI-licensing patterns of *forget* across languages and then hopefully come up with the right theory of *forget*, but that has to remain a project for future work.

[7]I simplify here a bit. Progovac, in fact, observes that there are some cases of acceptable *any* in the non-clausal argument of non-negated root sentences, but she classifies such examples as FCI usage of *any*. Her explanation was then questioned by Horn & Lee (1995); Hoeksema (1996). Thanks to one of the anonymous reviewers for pointing out the debate.

overlap with adversative predicates. Most frequent collocations of positive verbs occurring with k- pronouns – from Czech National Corpus – are verbs as *za-kázat* 'forbid,' *odmítnout* 'refuse' and *vyhýbat* 'avoid.' But there are also many examples of licensing by positive existential modals or imperatives. Such cases are not explainable as "inherently negative" in the style of adversative predicates; see Strachoňová (2017) for many valuable data points).

(16)   a.   John lacks any sense of humor.
       b.   John came without any present.

(17)   Petr odmítal jakoukoliv pomoc.
       Petr refused k-pronoun help
       'Petr refused any help.'   (Czech)

In this section, a historically very influential syntactic theory of NPIs licensing was discussed. There are obvious shortcomings of the theory, discussed partially above and furthermore in section §2.2. Maybe the most serious problem is the attempt to unify three Slavic classes of expressions under the roof of the binding theory. Today it seems more reasonable to treat neg-words really in syntax. One of today's standard theories of neg-words is Zeijlstra (2004) – different in formalization but similar to Progovac (1994) in taking locality constraints seriously as syntactic in nature. And as for k-pronouns and indefinite pronouns, they ought to be explained via some appropriate semantic or pragmatic theory (already the problems of adversative predicates pointed out the difficulty of finding a reasonable syntactic licensor for k-pronouns or English NPIs in a purely syntactic framework like Progovac 1994). But despite these problems, Progovac (1994) is the first serious attempt to deliver a theory of various NPI classes, starting with Slavic data but aiming at a general framework of cross-linguistically conceived polarity licensing.

2.2 Semantic theories

The semantic approach to NPI licensing is still the standard theory of the semantic negative dependent expressions. There are various ways of approaching the idea that NPIs are licensed purely semantically. The most widely accepted reasoning is based on the downward entailing approach of Ladusaw (1992), but the idea can be found in influential works of Heim (1984); Ladusaw (1992); Kadmon & Landman (1993); Krifka (1995); Giannakidou (1997); Lahiri (1998) too. It usually starts with the observation (introduced quickly already in section §1) that next

to negation, there are many other prototypical NPI licensing contexts. Such contexts include downward entailing quantifiers, antecedents of conditionals, the scope of the exclusive particle *only*, adversative predicates, comparatives, and superlatives. All the contexts are claimed to share the property of reversing the direction of entailment. The monotonicity reasoning is demonstrated in the predicate logic implications in (18). In the non-negated formula (18a) (corresponding to a natural language positive sentence under (18b)), the entailment goes from a subset (intersection of *P* and *Q*) to a superset (union of *P* and *Q*). In a negated formula (18c) (and corresponding natural language sentence under (18d)), the entailment is reversed and proceeds from a superset (union) to its subset (intersection). The same entailment reversal can be observed in the difference between upward-entailing quantifiers as *some* versus downward entailing quantifiers like *few* demonstrated in (19).

(18) a. $\exists x[P(x) \wedge Q(x)] \rightarrow \exists x[P(x) \vee Q(x)]$

     b. $\exists x[\text{RED}(x) \wedge \text{WINE}(x)] \rightarrow \exists x[\text{RED}(x) \vee \text{WINE}(x)]$
John likes red wine. $\rightarrow$ John likes wine.
John likes wine. $\nrightarrow$ John likes red wine.

     c. $\neg\exists x[P(x) \vee Q(x)] \rightarrow \neg\exists x[P(x) \wedge Q(x)]$

     d. $\neg\exists x[\text{RED}(x) \vee \text{WINE}(x)] \rightarrow \neg\exists x[\text{RED}(x) \wedge \text{WINE}(x)]$
John doesn't like wine. $\rightarrow$ John doesn't like red wine.
John doesn't like red wine. $\nrightarrow$ John doesn't like wine.

(19) a. Some people drank red wine. $\rightarrow$ Some people drank wine.

     b. Some people drank wine. $\nrightarrow$ Some people drank red wine.

     c. Few people drank red wine. $\nrightarrow$ Few people drank wine.

     d. Few people drank wine. $\rightarrow$ Few people drank red wine.

The semantic approach is very successful: it explains the distribution of so-called weak NPIs (like English *any*; more on different types of NPIs in the section §2.2.2) via a unified semantic property. The property of NPI licensing is that they occur in downward entailing (entailment reversing) environments (but see §2.2.1 for many qualifications). Despite some problems discussed below, the DE-based explanation of NPI licensing is still considered a benchmark of semantic reasoning and appears in standard textbooks on formal semantics (Portner 2005; Coppock & Champollion 2024; among many others). The proper formalization of DE licensing can be stated as (20), and DE is defined in (21), both after von Fintel (1999). The explanation of weak NPI acceptability in a sentence like *John didn't*

drink any wine yesterday (contrasted with ungrammaticality of **John drank any wine yesterday*) is as follows: (22) states the entailment pattern for *red wine* and *wine* (x and y from (21)), subset relation on sets corresponds to the entailment in (21) as $\forall x[[\text{RED}(x) \wedge \text{WINE}(x)] \rightarrow \text{WINE}(x)]$. But negation (*F* from (21)) reverses the sub-set superset relationship: $\forall x[\neg\text{WINE}(x) \Rightarrow \neg[\text{RED}(x) \wedge \text{WINE}(x)]]$. And because of this DE entailment reversal, *any* is licensed as stated in (20).

(20) Fauconnier-Ladusaw's Licensing condition: An NPI is only grammatical if it is in the scope of an α such that $[\![\alpha]\!]$ is DE.   (von Fintel 1999: 100)

(21) A function f of type $\langle \delta, \tau \rangle$ is downward entailing iff for all x, y of type δ such that $x \Rightarrow y$: $f(y) \Rightarrow f(x)$ [' $\Rightarrow$ ' stands for cross-categorial entailment]. (von Fintel 1999: 100)

(22) $\{x \,:\, x \text{ is a red wine}\} \subseteq \{y \,:\, y \text{ is a wine}\}$

2.2.1 Some problems of purely semantic theories

Even if the criterion in (20) is very successful, during years of NPI exploration, there appeared many problems. The problems lead to some ramifications (and in some cases abandonment or replacement of the criterion; see Giannakidou 1997; Linebarger 1987). Very famous problems arise when we scrutinize monotonic properties of *only*, conditionals, superlatives, and adversative predicates. All these expressions seem to license NPIs but do not fit the downward entailing defining property, at least at first sight. A proper exposition of such problems goes beyond the scope of this chapter; see von Fintel (1999) for the classic reference and Gajewski (2011) among many others for a recent refinement.[8] But let me demonstrate the nature of the problems of simple DE theory with an example. Despite the validity of the sentential logic tautology in (23a), conditionals in natural language seem not to allow the strengthening of antecedents. Consider counter-intuitive reasoning from (23b) to (23c), but even if such reasoning can sound paradoxical when viewed intuitively, it would be formalized in classical logic as the correct strengthening in (23a). As a consequence, it seems that natural

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[8]As one of the anonymous reviewers correctly notices, von Fintel (1999) is just one of the attempts (even if very influential and empirically successful) to overcome the limitations and problems of a purely semantic approach to NPIs. Historically sorted, at least the following researchers – Heim (1984); Kadmon & Landman (1993); Israel (1996) – proposed various pragmatic relativizations of the entailing conditions necessary for NPI licensing, be it contextual entailment, fixation of contexts, or integrating background knowledge of communication participants into the reasoning important for NPI licensing.

language conditionals do not exhibit downward entailing property, but despite that, they are one of the prototypical NPI licensors. Similar problems were observed with the contexts mentioned above (adversative predicates, superlatives, …) too. Even if the environments are not intuitively downward entailing, they license NPIs like *any*: see (24).

(23) a. $(p \rightarrow q) \rightarrow ((p \wedge r) \rightarrow q)$
     b. If [you pet a dog] it will be happy. $\nrightarrow$
     c. If [you pet a dog and kick it] it will be happy.

(24) a. If you pet any dog, it will be happy.
     b. I am sorry to give you any trouble.
     c. Only Peter drank any tea.

The analysis of the problems concerning conditionals (and other problematic environments) proceeds in the following way (after von Fintel 1999). First, the basic notion of downward entailment is replaced by Strawson downward entailment (SDE), and SDE adds to the standard argument a presupposition of the sentence. Second, the added presupposition plus the at-issue meaning of the sentence then qualify for the downward entailing property as described in (21).[9] For conditionals like (23b), the added presupposition would concern the current modal horizon. Modal horizons are sets of worlds that are compatible with everyday reasoning about conditionals. For (23b), possible worlds where an agens both pets and kicks a dog are beyond the current modal horizon. Consequently, adding a presupposition to the effect that the current modal horizon is compatible only with worlds where only petting a dog would cause happiness of a dog would save the downward monotonicity of conditionals and explain the grammaticality of an NPI in (24).

This gives some impressionistic introduction to SDE reasoning, but let us demonstrate the SDE on a simpler pattern since a proper treatment of reasoning in conditionals is surely beyond the scope of this article. Gajewski (2016) offers exactly such a type of example; he discusses the cases of NPI licensing by plural definite NPs like in (25). But the entailment in (26) is invalid since knowing that the supremum of (in the context) salient students drank beer does not tell us anything about their nationality. Exactly a similar problem as discussed above with respect to the pattern in (24) is encountered – expressions that are not DE do license NPIs.

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[9]The formal definition of SDE is in (27).

(25) The students who have any beer are sharing it. (after Gajewski 2016: ex. 2)

(26) The students drank beer. ↛ The German students drank beer.

The exact definition of Strawson downward entailment is in (27). In (26), the conclusion wasn't entailed by the premise. But according to the (27), the presupposition of the conclusion (the existence and uniqueness presupposition of the definite description in conclusion) should be granted as a premise in the argument as demonstrated in (28). Then the argument becomes valid, although the price is obvious: the entailment must take into account pragmatic notions like presupposition. Despite that, SDE was successfully applied to many cases of NPI licensing in environments that simply are not DE, so it is a useful linguistic tool.

(27) Strawson Downward Entailingness   (after von Fintel 1999: 104)
A function f of type $\langle \sigma, \tau \rangle$ is Strawson-DE iff for all x, y of type σ such that $x \Rightarrow y$ and $f(x)$ *is defined*: $f(y) \Rightarrow f(x)$.

(28) The students drank beer.
There are salient German students.
⊨ The German students drank beer.

But even if the solution via Strawson downward entailment is widely accepted today, there still remain problems that are not well-understood. One of them (important later – see section §2.3.3) is the following one: von Fintel (1999) and his SDE predicts that adversative predicates as *sorry, regret, amazed, difficult,* or *refuse* can license NPIs because adding a (usually factive) presupposition unmasks their hidden DE properties. But predicates like *want, glad,* or *like* cannot license NPIs because they are not even SDE (they are usually analyzed as upward monotonic but see von Fintel (1999) for qualifications). The prediction seems to be mostly right: compare the contrast between (29a) and (29b). But there is a special type of context (discussed by Kadmon & Landman 1993 already) where *glad* can license NPIs. Such contexts permitting NPIs under *glad* have a special interpretation called "settle for less" by Kadmon & Landman (1993). The core description of such contexts demonstrated in the example (30) is the following: the speaker wanted an alternative (higher) number of tickets, but because he considered the situation so dire that even lousy tickets were the only possibility, he settled for less than he would normally want. For some reasons (not totally clear, but see Alonso-Ovalle 2016 for some recent insights), it seems that other adversative predicates like *want, hope,* or *wish* at least in English do not allow the settle-for-less reading and consequently cannot license NPIs. Nevertheless, to

sum up, the current sub-section: the semantic approach (if enriched with a pragmatic notion like SDE) can deal with the majority of more complicated cases where allegedly non-downward entailing expressions license NPIs (and which were correctly pointed out already by Linebarger (1987) as not simply downward entailing).

(29)   a.   I regret there is any idea like that.

       b.   # I am glad there is any idea like that.

(30)   I am glad that we got any tickets.

2.2.2 Types of NPIs

Another step in broadening the empirical coverage of semantic NPI theories was a seminal work of Zwarts (1998) where various types of NPIs are, for the first time systematized, and a purely semantic explanation of their differing distribution is offered. This classification of NPIs was especially important from the perspective of Slavic languages as it inspired the most thorough semantic approach to Slavic NPIs: Błaszczak (2001) and some following works of her like Błaszczak (2003) and Błaszczak (2008); Błaszczak's contributions are discussed in §2.2.3. Consider the first examples of the two most prominent classes of NPIs: weak in (31) and strong in (32). As evident, only negation and negative quantifiers license STRONG NPIs (such as *until midnight* in (32)), while for the licensing of WEAK NPIs as *any*, the downward entailing environment is enough: (31)

(31)   a.   John didn't leave any message.

       b.   No teacher left any message.

       c.   Few teachers left any message.

       d.   At most ten teachers left any message.

       e.   # Some teachers left any message.

(32)   a.   John didn't leave until midnight.

       b.   No teacher left until midnight.

       c.   # Few teachers left until midnight.

       d.   # At most ten teachers left until midnight.

       e.   # Some teachers left until midnight.

The logical property which licenses strong NPIs share is a strengthened form of entailment reversal and usually is named ᴀɴᴛɪ-ᴀᴅᴅɪᴛɪᴠɪᴛʏ.[10] The definition of anti-additivity is in (34): it represents a half of the well-known deMorgan's laws of conjunction/disjunction transformation via negation (Tarski 1994: 46). Standard logical negation obeys two deMorgan's laws in (33).

(33) a. $\neg(p \lor q) \leftrightarrow \neg p \land \neg q$
      b. $\neg(p \land q) \leftrightarrow \neg p \lor \neg q$

Anti-additivity picks one of them, so we can view anti-additivity as a subset of negation properties. (35) illustrates the anti-additivity (the quantifier *no* is anti-additive since negation is always anti-additive, as is clear from deMorgan's laws). But DE quantifiers like *few* in (36) are not anti-additive – imagine a scenario with 10 students, three of them drinking and three of them smoking, then $\lor$ part of (36) is false while $\land$ part of (36) is true. That explains why *no* is licensed by the strong NPI *until midnight* in (32) and not licensed by just downward entailing quantifier *few*.[11]

(34)   Anti-additive function: $F(x \lor y) \leftrightarrow F(x) \land F(y)$

(35)   No student smokes or drinks.
       $\leftrightarrow$ No student smokes and no student drinks.

(36)   Few students smoke or drink.
       $\nleftrightarrow$ Few students smoke and few students drink.

2.2.3 Semantic theory applied to Slavic data

Błaszczak (2001) and other works by her apply this classification of NPIs to Slavic data. First, Błaszczak observes that generally: k-pronouns (Polish pronouns with

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[10]A popular alternative explanation of strong NPIs, and their behavior can be found in Gajewski (2011). Gajewski describes their stricter distribution via downward entailing properties but checked both in at-issue meaning and in the presupposition/implicature part of the meaning. More pragmatic approaches to NPI licensing will be presented in section §2.3.

[11]As one of the reviewers correctly remarks, anti-additivity as presented in this section and its contrastive logical behavior with respect to DE is just a part of the whole picture, presented carefully and systematically in Zwarts (1998). Zwart's main idea then is that there is a hierarchy of negative strength: downward entailing < anti-additive < anti-morphic. Anti-morphicity is defined as: F is anti-morphic iff $F(\neg p) \leftrightarrow \neg F(p)$. Classical verbal negation is, of course, anti-morphic, since $\neg(\neg p) \leftrightarrow \neg\neg p$ but universal quantifiers, which are anti-additive, since $\forall x((P(x) \lor Q(x)) \to R(x)) \leftrightarrow \forall x(P(x) \to R(x)) \land \forall x(Q(x) \to R(x))$, are not anti-morphic because $\neg\forall x(P(x) \to Q(x)) \nleftrightarrow \forall x(P(x) \to \neg Q(x))$. The relative strength of the licensor is, for Zwarts (1998), picked up by weak, strong, and superstrong classes of NPIs, respectively.

the suffix *-kolwiek*) are licensed in prototypical NPI contexts. Such contexts include higher clause negation, questions, conditionals, the scope of downward entailing quantifiers, comparatives, adversative predicates, *before*-clauses, etc. Neg-pronouns (Polish pronouns usually beginning with *n-*) are generally licensed only by clause-mate negation: see (37) and (38).

(37) a. * Ewa nie chciała, żeby   Jan nikogo   zapraszał.
            Eve NEG wanted that.SBJV John neg-pronoun invited
            Intended: 'Eve didn't want John to invite anyone.'

                                            (Polish; Błaszczak 2003: 2)

     b. Ewa chciała, żeby   Jan nie nikogo   zapraszał.
            Eve wanted that.SBJV John NEG neg-pronoun invited
            'Eve wanted John not to invite anybody.'

                                            (Polish; Błaszczak 2003: 2)

(38) a. Czy   widziałeś tam kogokolwiek?
            whether saw.2SG   there anybody
            'Have you seen anybody there?'

     b. Jeśli ktokolwiek przyjdzie, daj mi znać.
            if   k-pronoun comes   let me know
            'If anyone comes, let me know.'

     c. Ewa nie chciała, żeby   Jan kogokolwiek zapraszał.
            Eve NEG wanted that.SBJV John k-pronoun   invited
            'Eve didn't want John to invite anyone.'

                                         (Polish; Błaszczak (2003: 2))

This is a familiar observation concerning the partial complementary distribution of two classes of Slavic pronouns, which was discussed already in the section §2.1 dedicated to the syntactic approach of Progovac (1994). But Błasczak's (2001) solution is different, and her critique of Progovac (1993) is correct. Błasczak (2001) criticizes syntactic approach of Progovac (1993) mainly on empirical grounds. One of her main arguments concerns the licensing of neg-pronouns by a preposition *bez* 'without.' The grammaticality of (39) is unaccounted by the syntactic approach of Progovac since there is no negation or polarity operator in Comp. But since (at least in Polish) neg-pronouns are fully licensed in the complement of *bez* 'without,' Błaszczak concludes that the semantic approach is more in accordance with the Slavic data. For more general problems of Progovac's syntactic theory of NPI licensing, see §2.1.

(39) Został   bez   nikogo.
      was-left.3sɢ without neg-pronoun
      'He was left without anyone.'

The core of Błasczak's (2001) proposal concerning Polish NPIs is the following:

1. K-pronouns are licensed in downward entailing or anti-additive environments. So in contrast to the syntactic binding-theoretic analysis of Progovac (1993), we see the standard semantic treatment of NPIs, which is more in accordance with the variability of NPI licensors: quantifiers, polarity operators, various types of embedding, etc., which cast doubt on any purely syntactic approaches to NPIs.

2. According to Błasczak (2001), neg-pronouns can occur only in anti-morphic environments.[12] The definition of the anti-morphic functor (adding one condition on top of anti-additivity) is in (40). An anti-morphic function is a classical negation because (deMorgan's laws) it obeys both requirements of (40). And it seems that only clausal negation fits such a requirement in a natural language. And because of its nature, it also satisfies another condition in (41): first negation before the equation sign in (41b) corresponds to f in (41a). But notice that anti-morphic are also negated truth-value ascribing predicates and neg-raising predicates: like *it is not true that ...* or *x does not believe that ...*. Both contexts will be discussed at the end of the current section.

Applied to examples in (37): a negated modal verb does not license neg-pronouns in its embedded clause, since from $\neg\forall[P]$ it does not follow $\forall[\neg P]$. Nevertheless, the ungrammaticality of (37) is not caused by the interfering modal since modals generally do not interrupt NPI licensing. Verbal negation, of course, licenses the clausemate neg-words. For k-pronouns in (38), the semantic analysis predicts that they should be grammatical in anti-additive conditionals (they are, in fact, Strawson anti-additive, see Gajewski 2011) or in a simple downward entailing context like negated embedding modal verb.

(40) A functor F is anti-morphic iff:
      a. $F(x \wedge y) \leftrightarrow F(x) \vee F(y)$

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[12] As one of the reviewers correctly points out, it is not clear whether this claim is valid even for sentences with ≥ 2 occurrences of neg-words, since the scopally lowest neg-word is in the anti-additive environment, but the sentence is still grammatical.

b. $F(x \lor y) \leftrightarrow F(x) \land F(y)$

c. $\neg(x \land y) \leftrightarrow \neg(x) \lor \neg(y)$

d. $\neg(x \lor y) \leftrightarrow \neg(x) \land \neg(y)$

(41) a. $f(\neg x) = \neg f(x)$

b. $\neg(\neg x) = \neg\neg(x)$

The semantic approach is much more appropriate than the syntactic approach, especially in its treatment of k-pronouns. The set of environments where k-pronouns appear forms a natural semantic class. But there are some problems with the semantic approach too. Some of them were observed in the recent general linguistic works, which usually argue for a semantic and pragmatic approach to NPIs instead of a purely semantic one (see Krifka 1995; Gajewski 2011; Chierchia 2013 among many others). Nevertheless, the standard approach today is to treat neg-words as a separate class of negative dependent expressions licensed in syntax (see already Krifka 1995 for some insightful remarks and Zeijlstra 2004 for the current *de facto* standard theory of neg-words). But let us discuss some empirical problems which are particularly interesting and concern Slavic data:

1. As (42a) shows, only NPIs are licensed in neg-raising contexts; real neg-words are not acceptable there (see Dočekal & Dotlačil 2016a for the experimental data confirming this claim). But neg-raising predicates are anti-morphic even in their embedded clauses, so a purely semantic approach predicts that both NPIs and neg-words should be licensed there (contrary to facts). This asymmetry raises serious problems for any semantic treatment of neg-words.[13]

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[13]One of the anonymous reviewers correctly remarks that the status of neg-raising predicates as either anti-morphic or as anti-additive is, to some extent, theory-dependent. In approaches where the negation would really be present syntactically and semantically in the embedded clause, they would be anti-morphic, but for Gajewski (2005; 2007), the embedded clauses of neg-raisers are just anti-additive. Gajewski (2007: 305) empirically supports his classification with the following entailment pattern where (for him) the first entailment is valid, but the second one is not. And since, for him, the crucial test for anti-morphicity is the entailment $f(x \land y) \rightarrow f(x) \lor f(y)$, he argues for the mere anti-additive status of neg-raising embedded clauses.

(i) John doesn't think Mary left and John doesn't think Bill left.
   $\rightarrow$ John doesn't think Mary left or Bill left.

(ii) John isn't certain that Mary left and John isn't certain that Bill left.
   $\nrightarrow$ John isn't certain that Mary left or Bill left.

2. The same point holds for truth-value ascribing predicates: (42b) and (42c) are equivalent, but only (42e) allows negative concord items. Again purely semantic theory of neg-words is the problem here, while syntactic locality constraints fare better.[14]

(42) a. Petr nechce,   aby ani jeden student / #nikdo   propadl.
         Petr NEG.wants COMP even one   student   neg-person failed
         (Intended:) 'Petr doesn't want even one student/neg-person to fail.'

                                                                (Czech; MD)

    b. It's not true that Peter was sleeping. ↔

    c. It's true that Peter wasn't sleeping.

    d. *Není   pravda, že nikdo   přišel.
        NEG.is true   that neg-person came
        Intended: 'It's not true that neg-person came.'

    e. Je pravda, že nikdo   nepřišel.
        is true   that neg-person NEG.came
        'It's true that neg-person didn't come.'

                                                                (Czech; MD)

Let us summarize the current section. The relationship between verbal negation and the morphological negation on neg-words is a syntactic phenomenon; trying to explain it in semantics leads to empirical problems. There are NPIs in Slavic languages, though, which seem to behave in the way described by Błasczak (2001), namely as anti-morphic NPIs (Czech *ani jeden* is an example of such an NPI). But the Slavic neg-words are (it seems from today's perspective) better delegated to purely syntactic rules.

2.3 Pragmatic theories

After summarizing two types of NPI theories applied to Slavic data in the previous sections (a syntactic theory in §2.1 and a semantic one in §2.2), I will fo-

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I'm not sure whether his argument is very strong since the predicate logic implication $\neg\forall x(Px \wedge Qx) \rightarrow (\neg\forall xPx \vee \neg\forall xQx)$ is valid. Recent work on necessity modals (Agha & Jeretič 2022) opens up a possibility to formalize certain necessity modals not as universal quantifiers. Going in this direction would weaken Gajewski's argument even more. Nevertheless, following this route of argumentation, would be intriguing but would lead us too far away from the merit of the current chapter.

[14]Gajewski (2007: Appendix to Sect. 2) offers a semantic treatment of the fact that strict NPI is not licensed in the clauses embedded under *it's not true that* predicates. The proposal works with the idea of presupposition-canceling properties of *true*; see Gajewski (2007: 308–310) for details. Thanks to one of the anonymous reviewers for reminding me of this passage.

cus on the last type of approach to NPIs – a pragmatic one. The pragmatic approach has not been systematically applied to Slavic languages (at least not to the same extent as semantic and syntactic theories). But there is some work in this direction (as Tomaszewicz 2013, **gajic2016coordination**; Gajić 2022, Dočekal & Dotlačil 2016c or Dočekal & Šafratová 2019). But let us start with the general-linguistic properties of this approach. Currently, it seems that the pragmatic theories of polarity constraints are *de facto* standard, one of the recent formalizations, namely Chierchia (2013), is probably the most widely used framework in the area. One of the applications of Chierchia (2013) to Slavic data can be found in **gajic2016coordination**. The shared idea of all pragmatic theories of NPI is that in describing polarity effects, we have to consider both the semantic properties of the expressions under consideration and general pragmatic mechanisms as well. The formalizations usually agree on the idea that NPIs introduce alternatives, and polarity effects emerge when something goes wrong during the computation of alternatives and their inclusion into the truth conditions. The execution of these ideas can then proceed either via the postulation of exhaustification operators present in syntax (like Chierchia 2013) or in the neo-Gricean spirit where the pragmatic mechanisms are more related to general rules of rational communication.

In particular, I will follow the NEO-GRICEAN PRAGMATIC APPROACH to NPIs as introduced by Krifka (1995) and followed by many others (especially the work of Crnič 2011 and Alonso-Ovalle 2016 will be of most relevance). But for the present purposes, nothing hinges too much on the adopted framework, and it seems to me that it would be possible to reformulate the present section in the framework of Chierchia (2013). Nevertheless, let us first illustrate the typical problems pragmatic theories (unlike syntactic or semantic) can deal with. Consider the Czech SCALAR PARTICLES (SP) *i* and *ani*, which have a complementary distribution to some extent and resemble the complementary patterns described by Progovac (1993) and Błasczak (2001). Until now, I have described the polarity properties of NPIs, but from now on, I will focus on scalar particles, which represent an extension of the polarity landscape we discussed so far. Czech scalar particle *ani* behaves to some extent like a strong NPI requiring negation, but simple anti-additivity is not enough to license its appropriate occurrence. In the context of the familiar three books of Tolkien's *Lord of the Rings,* consider its acceptability (for experimental data supporting the following judgments, see Dočekal & Šafratová 2019). As (43a) shows, *ani* cannot be licensed in downward entailing contexts only, but even the anti-additive operator is not able to license all possible occurrences of *ani*: (43b). As the example shows, *ani* associates only with the bottom of the scale conveyed by the scalar expression (the contextual scale

being ⟨first volume, second volume, third volume⟩). Association with the top of the scale leads to *ani*'s unacceptability. The need for a pragmatic explanation, intuitively put, is the following: reading the first volume is the most likely case, the second less likely, and reading the third one is the least likely. *Ani* then requires not only a particular type of monotonicity but also ranking over the probability of alternatives where alternatives (required by *ani*) come from focus computation. Similarly, as can be seen from the contrast in (43c), *i* shows (at first sight) just the opposite pattern to *ani*: it occurs in positive sentences, and pragmatically it can associate only with the top element of a contextual scale. When it occurs in a negated sentence, it cannot associate with the top or bottom elements of a scale; see (43d).[15] Again, monotonicity alone is not enough to license its grammaticality. In summary: there are both semantic and pragmatic requirements of both *i* and *ani*. Technical explanation of these kinds of patterns follows in §2.3.1.

(43)   a. # Málo lidí   přečetlo ani   {první / třetí} díl   Pána prstenů
             few   people read   not.even first   third volume Lord Rings
             Intended: 'Few people have even read the first/third volume of the Lord of the Rings.'

       b.   Petr nepřečetl ani   {první / #třetí} díl   Pána prstenů.
            Petr NEG.read not.even first   third volume Lord Rings
            'Petr didn't read even first/#third volume of the Lord of the Rings.'

       c.   Petr přečetl i   {#první / třetí} díl   Pána prstenů.
            Petr read   even first / even third Lord Rings
            'Petr read # even the first / third volume of Lord of the Rings.'

       d. # Petr nepřečetl i   {první / třetí} díl   Pána prstenů.
            Petr NEG.read even first   third volume Lord Rings
            Intended: 'Petr have even read the first/the third volume of Lord of the Rings.'

                                                                              (Czech; MD)

2.3.1 Crnič's decompositional theory of scalar particles

I will introduce a pragmatic theory of Crnič (2011) where the constraints on scalar particle distribution and their semantic properties are explained via a pragmatic theory of presuppositions. The presuppositions are contributed by NPIs or scalar particles as *i*/*ani*. The description of scalar particles is related to Crnič's (2011)

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[15](??) is unacceptable under the scalar interpretation. But since *i* can be used also as an additive particle, there can be non-scalar contexts where (43d) would be acceptable. Thanks to Radek Šimík for this point.

pragmatic approach to English *even* as a polarity item. But especially in chapter 4 and chapter 5, where he describes scalar particles, he pays close attention to cross-linguistic variation and discusses many intriguing properties of Slovenian scalar particles. So unlike in §2.1 and §2.2, where I summarized two contributions to polarity research explicitly focused to (mostly) Slavic data, in this section, I will introduce a more general framework. The framework was only partially applied to Slavic data more as a form of demonstration. This, of course, has some consequences; the nice one is that Crnič's framework is an explicit formal theory of presupposition and polarity effects of NPIs/scalar particles. The worse one is that the approach still lacks proper empirical meat, and naturally concerning Slavic data (even if it offers many insights) there are many points where it has to be fine-tuned or slightly changed to be in accordance with the data. Be it as it may, another strong aspect of Crnič's theory is its further component which describes the distribution of scalar particles as determined partially by the spectrum of the relevant scalar particles in the particular language. In other words, there is a competition between various types of scalar particles, and their behavior is a result of two factors. The first factor is the presuppositions calculation. The second factor is a competition between various expressions available for the lexical insertion.

2.3.2 Three basic types of scalar particles

I will start by introducing fundamental dichotomies in the territory of scalar particles. I will deal mostly with so-called weak and strong scalar particles (e.g., German expressions *sogar* and *auch nur*). And I will only scratch the surface of concessive scalar particles like Slovenian *magari* or Spanish *siquiera*.

2.3.2.1 Nondiscriminating scalar particles   The first type of scalar particles is the one associating both with strong and weak elements in their immediate surface scope. The most famous linguistic example is English *even*: its strong association is free, (44a), and it can associate with weak expressions in non-upward monotonic embedding too: (44b). There are no known Slavic examples of such undiscriminating type of *even*, Crnič (2011: 129) cites French *même* as a second example, next to English *even*.[16]

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[16]It remains to be worked out whether there is no example of Slavic nondiscriminating scalar particles or whether it so far remained hidden. One of the anonymous reviewers suggests that Polish *nawet* 'even' can be used both with strong and weak associated expressions. Similarly, in Czech the scalar particle *dokonce* 'even' seem to associate with both ends of the scale. Nevertheless, as natural occurences suggest, *nawet* is out of the blue more acceptable with weak elements, for strong elements it usually requires some intervening modal or other operator.

(44)   a.   John drank even TEN beers.

        b.   Paul didn't drink even ONE beer.

17

2.3.2.2 Strong scalar particles   The second class of particles, STRONG SCALAR PARTICLES, comprises of such particles which associate with strong scalar elements. This class is well documented for many natural languages, Crnič (2011: 130) discusses German *sogar* and Slovenian *celo*. We can add Czech scalar particle *i* introduced already above: see a grammatical association of *i* with a strong element in (45) where an unlikelihood presupposition of *i* requires the prejacent to be less likely than the alternatives (drinking $n < 10$ beers) which intuitively is the case (formalizations below).

(45)   (V těch letech) Petr vypil   i   DESET piv.

        in those years   Petr NEG.drank even ten   beers

        '(In those years) Peter drank even ten beers.'   (Czech)

In Crnič's theory, strong scalar particles seem to be superficially stuck in their base position when they would appear in a downward entailing environment. Otherwise, they would be grammatical contrary to natural language data, see ungrammatical (46a) with the un-acceptability explaining formalization in (46b). If the scope of *i* would be above negation ([i [not [Petr drank one$_F$ beer]]]), the unlikelihood presupposition of *i* would be satisfied.

(46)   a.   * (V těch letech) Petr nevypil   i   JEDNO pivo.

           in those years   Petr NEG.drank even one   beer

           Intended: '(In those years) Petr didn't drink even one beer.'

                                                   (Czech)

        b.   [not [i [Petr drank one$_F$ beer]]]

Czech *dokonce* behaves just the other way round, it occurs most naturally with strong elements. In summary, the proper classification of promising candidates for Slavic nondiscriminating scalar particles remains a future project.

[17](44a) out of context can sound a bit strange in English but as the following sentence from Sketchengine (Kilgarriff et al. 2014) English Web 2021 shows, English *even* associates with the strong scalar elements: *Some workers even drank 3-4 liters of the contaminated water after mine managers failed to warn them.*

2.3.2.3 Scalar particles that may associate only with weak elements The last type of particles I will write about, namely WEAK SCALAR PARTICLES, are particles which associate with weak elements. Unambiguous examples are German *auch nur*, *einmal*, English *so much as* and Slovenian *niti*. English *even* can be used as a weak particle too, but in that case, it must be embedded under non-upward-entailing operator (other weak scalar particles can appear only in non-upward entailing contexts too but they – unlike English *even* – are limited to such environments). Linguists approaching scalar particles from the typological perspective (like Crnič 2011: chapters 4 & 5 and Gast & Van der Auwera 2011) sub-classify weak scalar particles according to their possible scope under negation or other non-upward-entailing operators. Most constrained are scalar particles like German *einmal* and Slovenian *niti*: they appear only in the immediate scope of negation. The second subtype comprises scalar particles which occur in the scope of the non-upward-entailing operator but may not occur under negation, German *auch nur* or Slovenian *tudi* are scalar particles of this sort. Last, there are in-discriminating weak scalar particles, like English *so much as* which may occur both in the immediate scope of negation and in other non-upward-entailing environments as well.

Now, let us illustrate the classification at three types of Czech scalar particles corresponding to strong, weak, and negation requiring weak particles respectively. Following the introductory discussion of *i*, let us consider its type: *i* like German *sogar* requires association with strong elements: if the contextual scale is 1 to 10 beers, then only numerals contextually vaguely around 10 would make an appropriate focus associate of *i*, see (47) with acceptable strong associate and un-acceptable weak associate.

(47) Petr vypil i   {#JEDNO pivo / DESET piv}.
      Petr drank even one   beer ten   beers
      'Petr drank even #one/ten beers.'   (Czech)

The second type of Czech scalar particles, are expressions of type *byť jediný* 'at least/even one,' they generally appear in Strawson-downward entailing contexts like an antecedent of conditionals, under super-ordinate negation or generally in the scope of non-upward-monotonic operators like imperatives and some adversative predicates. Depending on their embedding their correct glossing to English is either 'at least one' or 'even one.' The expression seems to be frozen in cardinality, so is pre-destined for the weak association, consider (48), unlike *i* which (depending on the type of scale) can associate with different kinds of expressions. Nevertheless, the expression *byť jediný* 'even one' is not an idiom as witnessed

by various sortal version of the numeral included in it: it can count cardinality of objects like in (48) but also cardinality of events (*byť jednou* 'even once') or cardinality of a sequence of occurrences like *byť poprvé* 'even for the first time'.

(48) Jestli Petr vypije byť {jediné pivo / #deset piv}, tak   bude tančit.
      if   Petr drink just one   beer   ten beers then will dance
      'If Peter will drink just one beer/#just ten beers he will dance.'   (Czech)

The distinction between *i* and *byť jediný* follows the typology of strong and weak scalar particles assumed in Crnič (2011); Gast & Van der Auwera (2011) and can be formalized as lexical items competing for lexical insertion using a pattern in (49). The scale in (49) uses SEMANTICALLY INTERPRETED FEATURES formalized below but intuitively understandable as follows: EVEN is a feature responsible for the unlikelihood presupposition in examples like (45). SOLO is a feature formalizing the presupposition of likelihood in sentences like (48), where the weak scalar item is embedded in a Strawson downward entailing environment. The presuppositions of EVEN and SOLO are contradictory: the first requires unlikelihood against alternatives, the second one dictates the likelihood of the prejacent. Their conflict can be resolved only in environments reversing entailment.

(49) a. ⟨*i, byť jediný*⟩
      b. ⟨[EVEN], [EVEN][SOLO]⟩

The features EVEN and SOLO are semantically interpreted in (50) and (51) following Crnič (2011: 134). The part of both formulas, $p \lhd_C q$, means that in the context C (focus induced alternatives) the proposition p is at most as likely as the proposition q. The mechanism works under the assumption introduced to linguistics by Lahiri (1998): that there is a one-way relationship between logical strength and entailment. The relationship is: logically stronger propositions cannot be more likely than logically weaker propositions. Intuitively from the conjunction of two propositions *It rained, and it hailed* any of the propositions follows $((p \wedge q) \to p/(p \wedge q) \to q)$. The conjunction of the two propositions is logically stronger and less likely than any of its atomic propositions. More formally is the relationship between likelihood and entailment stated in (52).

(50) $[\![\text{EVEN}]\!]^{g,c}(C, p, w)$ is defined only if $\exists q \in C[p \lhd_c q]$.
      If defined, $[\![\text{EVEN}]\!]^{g,c}(C, p, w) = 1$ iff $p(w) = 1$

(51) $[\![\text{SOLO}]\!]^{g,c}(C, p, w)$ is defined only if $\forall q \in C[q \neq p \to q \lhd_c p]$.
      If defined, $[\![\text{SOLO}]\!]^{g,c}(C, p, w) = 1$ iff $p(w) = 1$

(52)   If $p \rightarrow q$ then $p \lhd_c q$.

I will now apply Crnič's (2011) pragmatic framework to Czech with a simple illustration of possible derivations. First, strong scalar particles as Czech *i* in an appropriate context like (47) would obtain a correct LF like (53) (in pseudo-Czech). The sentence is appropriate in all contexts where drinking ten beers is less likely then drinking alternative $n < 10$-number of beers. If the context is set up for a scale $1, \ldots, 10$, the presupposition of EVEN is satisfied and *i* can be spelled out in the structure as (53).

(53)   [EVEN C_1] Peter drank ten$_F$ beers.

Now, let us consider weak scalar particles, for a weak scalar particle in the Strawson downward entailing context like (48) a possible LF in (54) is obtained. The presupposition of SOLO is satisfied: to drink one beer is more likely than to drink $n > 1$ beers. The presupposition of EVEN (with a wider scope than the antecedent of implication) is satisfied too. Drinking one beer as a cause of dancing is less likely than drinking $n > 1$ beers as a reason for dancing intuitively. More formally: as usually, the antecedent of a conditional is Strawson downward entailing, so the weak prejacent becomes logically strong. If drinking one beer is a sufficient condition for dancing, then drinking $n > 1$ beers is a sufficient condition for dancing as well. All the contextual alternatives are entailed by the prejacent and due to (52) are less likely.

(54)   [EVEN C_1][[if [SOLO C_0] Peter drinks one$_F$ beer] he will dance]

The scale in (49) can be interpreted as the following morphological rules in (55a)/(55b) formalizing both the idea that *i* bears un-likelihood presupposition, while *byť jediný* bears two contradictory presuppositions, and the idea that the items compete for insertion. But before I tackle the competition part, let us again consider the details of weak scalar particles formalization. Weak scalar particles like Czech *byť jediný* bear both the un-likelihood presupposition of strong *i* and the likelihood presupposition formalized as the feature SOLO. The contradictory presuppositions of *byť jediný* explain its limited distribution. While EVEN in (54) scopes over an entailment reversing operator, SOLO scopes under it and consequently both presuppositions can be satisfied. Note as well, that this explains the ungrammaticality of (56). There is no entailment reversing operator over which EVEN would scope and the conflicting presuppositions of the two features (SOLO and EVEN) clash with each other necessarily. The prejacent cannot be both less likely and more likely than its alternatives (in any context).

(55)   a.   [EVEN] ↔ *i*
       b.   [EVEN][SOLO] ↔ *byť jediný*

(56)   # Petr včera   přečetl byť jedinou knížku.
        Petr yesterday read   even one   book
        Intended: 'Petr read just one book yesterday.'

2.3.2.4 Scalar particles and competition   The morphological rules in (55a)/(55b) do not explain the restricted distribution of *i* on their own (recall that *i* avoids weak contexts like (47)). But in the currents state of formalization, we predict that an ungrammatical sentence like (57a) would get assigned a correct LF like (57b). Such LF would be principally spellable as a sentence containing *i*. The LF (57b) would produce a sensible presupposition of EVEN because it scopes over the entailment reversing operator (the antecedent of conditional). In such a situation, the weakest scalar expression entails all the other contextual alternatives and becomes less likely than the alternatives.

(57)   a.   # Jestli Petr vypije i   jedno pivo, tak bude tančit.
             if   Petr drink even one   beer then will dance
             Intended: 'If Petr will drink even one beer he will dance.'
       b.   [EVEN C$_3$] [[if ~~EVEN C$_3$~~ Peter drinks one$_F$ beer] he will dance]

But such a spell out ignores the scale ⟨*i, byť jediný*⟩ where the elements COM-PETE with each other for insertion. This is quite a frequent situation in linguistics where competition between elements dictates their distribution. There are many possible formalizations of the old intuition that only the most specific item can be inserted and eventually blocks insertion of less specific competitors (called Panini's Principle by many, see Booij 2012 among others). Crnič uses Heim's (1991) Maximize Presupposition reformulation of the Panini's Principle. But I will rely on a neo-Gricean approach essentially following Krifka (1995) and his approach to NPIs (both approaches are well suited for working with competing items differing only in terms of non-at-issue meaning). In the case at hand: there is a competing LF like (58) which is more feature-specific (and would be spelled out as a sentence containing *byť jediný*):

(58)   [EVEN C$_3$][[if ~~EVEN C$_3$~~ [SOLO] Peter drinks one$_F$ beer] he will dance]

There is only one more presupposition of (58) that in the LF (57b): it is triggered by SOLO in its base position and requires its prejacent (drinking one beer) to be

more likely than contextual alternatives (drinking $n > 1$ beers). Both presuppositions (EVEN and SOLO) of (58) and the EVEN presupposition of (57b) are satisfied in natural contexts. Moreover, the assertion impact of both LF is the same, so the structures denote contextually equivalent propositions. Via the usual neo-Gricean reasoning: a speaker communicating (57b) would indicate that she is not in a position to assert (58) but as (58) and (57b) are contextually equivalent, we arrive to a contradiction caused by the competition of elements for insertion. But a speaker communicating (58) does not indicate anything about the non-assertability of (57b), since *byť jediný* (the spell-out of the features in (58)) is logically stronger and its assertion entails the logically weaker alternative (*i*). In simple words: if contextually more feature-specific *byť jediný* can be inserted, it blocks the insertion of the feature-poorer *i*. This doesn't happen in the case of strong contexts like (45) though. The SOLO component of *byť jediný* would produce a contradictory presupposition there. Consequently, *byť jediný* and *i* do not compete for insertion in contexts like that.

2.3.3 Scalar particles and negation

Recall that we have distinguished three classes of weak *even* SP: (i) indiscriminating (English *even*), (ii) weak particles requiring non-upward-monotonic environment (Czech *byť jediný* or Polish *chociaż/choć/choć* 'just'), and finally (iii) weak scalar particles limited to the immediate scope of negation. Crnič formalizes the distinction between the negation requiring particles (like Czech *ani* or Polish *ani*) and weak particles like *byť jediný* via a FORMAL UNINTERPRETABLE FEATURE (following essentially Zeijlstra 2004 and Penka & Zeijlstra 2005).[18] For Czech the morphological rules and corresponding scale would be as in (59) (similar to Crnič's (2011) analysis of Slovenian *tudi* and *niti*).

(59) a. [EVEN][SOLO] ↔ *byť jediný*
      b. [EVEN][SOLO]$_{[uNEG]}$ ↔ *ani*
      c. ⟨*byť jediný, ani*⟩

This neatly explains the limited occurrence of *ani* type of scalar particles to (in the majority of cases) sentences with negated predicates (but see Dočekal & Dotlačil 2016a,c for qualifications, especially concerning neg-raising contexts). Moreover, it explains some cases of *byť jediný* incompatibility with negation; Crnič shows this "avoid negation" constraint in the following Slovenian sentence.

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[18]Thanks to one of the reviewers for suggesting that Czech and Polish *ani* and Czech *byť jediný*/Polish *chociaż/choć/choć* do not behave differently in this respect.

(60)   # Janez ni   prebral tudi ENE knjige.
      Janez not read   even one book
      'John did not read even one book.'   (Slovenian; Crnič 2011: 139)

The direct translation of (60) into Czech sounds distinctly odd, and there are other cases of *byť jediný* type of scalar particles which are incompatible with negation (see Crnič 2011: chap. 5 for German, Spanish and Greek data). The blocking is also familiar in Slavic competition of indefinites (or free choice items) and neg-words (see Pereltsvaig 2004). Moreover, the "avoid negation" rule follows the same logic of competition induced above to explain the blocking of strong scalar particles by weak ones. This led Crnič to postulate the following typological implicational relation, which is supposed to be operative in all negative concord languages.

(61)   *Implicational relation for weak scalar particles*
      There is a scalar particle that may only be weak and that only occurs in the immediate scope of negation in the language. → No other weak scalar particle that may only be weak occurs in the immediate scope of negation in the language.   (after Crnič 2011: 131)

But even if the generalization is linguistically reasonable and supported by the data above, I have serious doubts about its validity. First, let us look at the empirical facts. It is easy to find many natural occurrences of both Czech *byť jediný* and Slovenian *tudi* weak scalar particles in negated sentences. Consider (62) and (63); the Czech examples are from Czech National Corpus (Křen et al. 2016).

(62)   a. Nemají   byť jediný věšák na kabáty.
         NEG.have even one   stand for coats
         'They lack even one coat-stand.'

      b. Nikomu   ze   soutěžících nepoložil byť jedinou otázku.
         neg-person from competitors NEG.ask   even one   question
         'He didn't ask any competitor even one question.'

      c. Nikdy   by se   neodvážily byť jediným slovem projevit svou
         neg-time SBJV REFL NEG.dare even one   word   manifest their
         nespokojenost.
         discontent
         'They didn't dare by even one word to manifest their discontent.'

                                                   (Czech)

(63)   Ni   izpustil tudi ene same dirke.
      NEG pass   even one single race
      'He didn't pass even one race.'   (Slovenian; Lanko Marušič, p.c.)

Even if it is true that in some configurations negating *byť jediný* type of weak scalar particles leads to unacceptability, there is definitely no general ban on negating weak scalar particles even in negative concord languages like Czech or Slovenian (against Crnič's 2011 typological rules as (61)). There are, of course, many possible explanations why the putative blocking between the items on scale (59) does not happen in cases like (62) or (63). A proper investigation of this issue lies beyond the scope of this chapter, though, but I will at least hint at one probable solution. As observed already by Kadmon & Landman (1993) for certain usages of *any* and further scrutinized by Crnič (2011); Alonso-Ovalle (2016) for weak *even* carries in many contexts peculiar semantics which is usually termed settle for less (see also section §2.2.1).

Let me demonstrate the semantics on example in (64a). The example has the following meaning ingredients: (i) the speaker of the sentence would prefer to buy more than one ticket; (ii) but he settled for one ticket. Slavic b-NPIs like Czech *byť jediný* (or Slovenian *tudi*) can have a settle-for-less reading, at least in some contexts. But this is not a general feature of weak scalar particles; compare (64b) with a-NPI *ani* (64b), which is compatible with a speaker who did not care about how many tickets he bought at the end, *ani* would be strange in a settle-for-less context. Consequently, at least some Slavic languages with b-NPIs seem to carry the settle-for-less semantics, unlike weak a-NPIs.[19]

(64)   a. Nakonec jsem nekoupil   byť   jediný lístek.
           finally   AUX NEG.bought even one   ticket
           'At the end, I didn't buy even one ticket.'

       b. Nakonec jsem nekoupil   ani   jeden lístek.
           finally   AUX NEG.bought even one   ticket
           'At the end, I bought not even one ticket.'   (Czech)

2.3.4 Short note on concessive scalar particles

In the previous section, we observed that Slavic b-NPIs (unlike a-NPIs) could carry the settle-for-less meaning. The main idea of explaining the lack of block-

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[19]One of the anonymous reviewers notices that if *byť jediný* in examples like (62) can be substituted with the a-NPI *ani* without any meaning difference, the competition story offered in §2.3.4 would be weakened. Intuitions of Czech native speakers I consulted support the subtle difference discussed in this section, although (for obvious reasons) it is not easy to demonstrate them on (62). Nevertheless, the difference can be made more visible in the following scenario: imagine a man who always wanted to stay a bachelor without children; in such a context, he can say *Vyšlo to, nemám ani jedno dítě* 'It worked. I don't have even one child' (a-NPI) but to say *Vyšlo to, nemám byť jediné dítě* 'It worked. I don't have even one child' (b-NPI) is conceived by native speakers as incoherent.

ing between *ani* and *byť jediný* under negation would be the following: it seems reasonable that b-NPIs (*byť jediný*) can spell out a semantics unavailable for a-NPIs (*ani*); if they do, like in (64a), they are not less specific than a-NPIs, and the usual blocking is gone. In cases like (60) used by Crnič, there is no plausible settle-for-less semantic component, which would be spelled out by b-NPIs and blocking kicks in. In other words, I claim that weak b-NPIs sometimes behave like concessive scalar particles. But to get this idea working, we have to make a short detour to proper concessive particle territory.

Concessive scalar particles are expressions like Greek *esto*, Spanish *aunque sea*, *siquiera*, Slovenian *magari* and Czech *alespoň*. They occur in downward entailing contexts, in questions, and in some modal contexts. Moreover, there is a partial overlap of concessive scalar particles with weak scalar particles.[20] Consider desire predicates like *want* in Czech (65a). Note, that in both items (*byť jedenkrát* and *alespoň jedenkrát*) are glossed with *at least* (contrast this with (48) where *byť jediný* was glossed as *even one*). And finally, both weak and concessive scalar particles are ungrammatical under doxastic/epistemic predicates as *think*, *know*: in (65b) and in the grammatical sentence (65a) (in the scope of the desire predicate) their associate is low on the pragmatic scale (this is a necessary, not sufficient condition though: it is low even in the example (65b), but the example is still ungrammatical).[21]

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[20]As one of the anonymous reviewers notes, there are approaches to sub-types of NPIs that resemble the reasoning in the current section. One such example is Rullmann (1996), where two different types of Dutch NPIs are described via two different theoretical approaches. The first via the scalar theory of *any* from Lee & Horn (1994) and the second via the non-scalar, domain-widening approach to *any* from Kadmon & Landman (1993). Despite some common properties, the approach in this section is different from Rullmann (1996) since both concessive and weak scalar particles are described as scalar.

[21]Both weak scalar particles and concessive particles are grammatical as well in the scope of desire predicates and positive emotive factives like in (i). And as one of the anonymous reviewers correctly remarks, this is a non-trivial problem since *glad* is not SDE and desire predicates like *want* are Strawson upward entailing (see von Fintel 1999). Crnič (2011: section 4.2.5) offers a technical solution to this problem which (in bare essentials) rests on the free choice interpretation of concessive scalar particles and its exhaustification interpretation leading to a non-entailing set of alternatives. Discussing Crnič's solution would lead us too far away from the goals of the current chapter, but all the details of Crnič's analysis should carry on to the cases of Czech concessive particles in contexts like (i).

   (i)   Petr je rád, že   {byť   jedenkrát / alespoň jednou} navštívil Grónsko.
         Petr is glad that even once   at.least once   visited Greenland
         'Petr is glad that he visited Greenland at least once.'

(65) a. Petr chce, aby Karel navštívil Grónsko {byť jedenkrát / alespoň
Petr wants that Karel visited Greenland even once at.least
jedenkrát}.
once
'Petr wants Karel to visit Greenland at least once.'

    b. * Petr ví, že {byť jedenkrát / alespoň jednou} navštívil
Petr knows that even once at.least once visited
Grónsko.
Greenland
Intended: 'Petr knows that he visited Greenland at least once.'

So far, we have discussed only the properties which are shared both by weak and concessive scalar particles. But there is an obvious difference between them: concessive scalar particles are additive, so they contribute a meaning of multiplicity, unlike the weak scalar particles (even if the additive presupposition can be masked in some contexts). The difference between them can be clearly observed in some contexts where concessive scalar particles are licensed but weak particles are not, see (66). The core meaning of (66) is the necessary condition: obtaining $n \geq 1$ scout badges is *sine qua non* for participating in a scout camp. This means that earning 2, 3, or more scout badges is even more positive; the additive component stems from the concessive scalar particle *alespoň*.

(66) (Abys mohl jet na skautský tábor), musíš získat {#byť
in.order.to be.able participate in scout camp have.to obtain even
jediného / alespoň jednoho} bobříka.
one at.least one beaver
'(For you to be able to participate in a scout camp) you have to obtain even one / at least one scout badge.'

Based on the observations above, I postulate that Slavic b-NPIs (Slavic *byť jediný*, Slovenian *tudi*) can realize some of the concessive scalar particles' meaning. More specifically, I will use the feature formalization of concessive particles from Crnič (2011: 109), below as (67). There are two components of [AT-LEAST]: (i) the familiar presupposition part: the prejacent has to be more likely than all its alternatives (this part is shared with the presupposition of SOLO, see (51)); (ii) the assertive meaning (different both from EVEN and SOLO since both EVEN and SOLO are vacuous in at-issue meaning; see (50) and (51)): there is at least one alternative to the prejacent which is at most likely and is true (can be the prejacent itself). Let us see the working of the formalization demonstrated for adversative predicate *regret* in (68). For Czech *alespoň*, I postulate a morphological rule in (69).

And because both presuppositions of (68) are satisfied in natural contexts: (i) the scalar presupposition triggered by AT-LEAST: it is more likely to visit Greenland once than $n > 1$ times; (ii) the scalar presupposition of EVEN: because *regret* is SDE, the weak associate becomes strongest (if somebody regrets that he visited Greenland once, he regrets that he visited it $n > 1$ times); *alespoň* can be inserted. The additive multiplicity part of the at-issue contribution is in the scope of the adversative predicate, so correctly not projecting, unlike the presupposition part of AT-LEAST. But recall that (68) is LF of (65a) where both *alespoň* and *byť jedenkrát* were acceptable with the same interpretation. This then shows that, at least in some cases, the b-NPI can spell out features like (69).

(67) $[\![\text{AT-LEAST}]\!]^{g,C}$
    $= \lambda C.\lambda p : \forall q \in C[p \neq q \rightarrow q \triangleleft_C p].\lambda w.\exists q \in C[q \triangleleft_C p \wedge q(w) = 1]$
    Crnič (2011: 109)

(68) [EVEN C_2][Petr regrets [that [AT-LEAST C_0] he visited Greenland once$_F$]]

(69) [EVEN][AT-LEAST] $\leftrightarrow$ *alespoň*

And if b-NPIs can spell out AT-LEAST features, we get the formal implementation of the idea from the beginning of the current section. Consider modified morphological rule for *byť jediný* in (70a) and repeated morphological rule for *ani* in (70b). In terms of features, the competition between the two items is then in equilibrium. Both items realize the same number of features; neither of them is more specific, stronger, and blocking the other. That explains the occurrences of b-NPIs under negation in examples like (62) – when b-NPIs realize the same number of features as a-NPIs, they can be inserted even in the immediate scope of negation. In cases like (60), the blocking works as proposed by Crnič (2011: chap. 5). Of course, the proper scrutiny of the proposed leak in the generalization (61) is beyond the scope of this chapter, but I hope to find more supporting data in future work.

(70) a. [EVEN][SOLO][AT-LEAST] $\leftrightarrow$ *byť jediný*
    b. [EVEN][SOLO]$_{[\text{uNEG}]}$ $\leftrightarrow$ *ani*

The empirical claims concerning Czech scalar particles and the features they realize are summarized in Table 1. This section has introduced the pragmatic mechanism of NPI licensing. It followed the seminal work of Krifka (1995) where the licensing of NPIs was rethought from the standard semantic downward entailing explanation to a pragmatic theory. In particular, the description of Czech

scalar particles was formalized in terms of *even*-based theory of NPI licensing, following Crnič (2011) (where more details and also references to other literature can be found). As was stated at the beginning of this section, the pragmatic turn, where the environments licensing NPIs are basically characterized via the logical requirements on the focus alternatives for the prejacent, can be cashed out in different frameworks, one widely adopted being Chierchia (2013). See see also **gajic2016coordination** for its application to Slavic data. The pragmatic explanation should be viewed as a continuation of the semantic theories, with which it shares the core idea that NPI licensing is a matter of semantic strength (or, entailment patterns; see (52)). Moreover, the pragmatic theory offers more flexibility and also a handle on non-monotonic licensing of NPIs (see again Crnič 2011 for details).

Table 1: Table of features for Czech scalar particles

Czech expression	features
i	[EVEN]
byť jediný	[EVEN][SOLO]
byť jediný	[EVEN][SOLO][AT-LEAST]
alespoň	[EVEN][AT-LEAST]
ani	[EVEN][SOLO]$_{[uNEG]}$

3 Topics related to negation (but not discussed in this chapter)

The previous sections delivered a story about NPIs and their treatment by (mostly) Slavic formal semanticists. The phenomenon of NPIs is a very active and massive topic in the current formal semantics. Consequently, even the summary of their linguistic history in Slavic formal semantics was not short. Despite that, due to limitations of space or scope, some significant Slavic contributions to polarity and negation were unable to be incorporated into this summary. It is acknowledged that these works would enhance the comprehensiveness of the current Handbook. But instead of summarizing them, let me at least enumerate them and shortly classify their areas of interest. But after I list the topics and contributions which are more or less directly related to negation, I will dedicate a special part

to the genitive of negation. The genitive of negation has a special place among the topics related to negation for many good reasons; the most important is the substantial one: in the Slavic genitive of negation, many core semantic and pragmatic mechanisms (as shifts of meanings, presuppositions, semantic bleaching, etc.) are manifested. The second important reason is historic: genitive of negation is in the center of both west and east Slavicists since Jakobson 1936; Babby 1980; Pesetsky 1982 to Paducheva 1997; 2006 and a recent semantic approach of Borschev & Partee 2002a,b,c, Partee et al. 2011; Borschev et al. 2010 which successfully tries to reconcile both stands of research and came up with a formal semantic approach to the phenomenon. I will rely heavily on this synthetic approach for its merits and also because it focuses on the semantic and pragmatic part of the genitive of negation debate. But first, let us list the topics which are not directly connected with the genitive of negation.

First, very close to the polarity licensing is the description of free choice items, their licensing, properties, and interaction with negation – works discussing Slavic data in this direction include (among others) the following ones: Pereltsvaig (2004), Yanovich (2005), Pereltsvaig (2008), Błaszczak (2008), Dočekal & Strachoňová (2014a), Denic (2015), Strachoňová (2017).

Next, there is an old and influential tradition describing negation and its interaction with information structure; see Hajičová (1974) as a classic reference, and other older works are referenced there. For a newer and partially corpus/semantic oriented work, see Dočekal & Strachoňová (2014b).

Further, there is a couple of articles discussing the interaction of negation with various types of Slavic conjunctions, see Abels (2005), Jasinskaja & Zeevat (2009), Arsenijević (2011), Tiskin (2017).

In recent years there also appeared experimental studies, focussing on Neg-raising and scalar particles, such as Dočekal & Dotlačil (2016b), Dočekal & Dotlačil (2016d).

Lastly, let me point out many papers discussing various phenomena at syntax/semantics interface like modals, weak islands, constituent negation, and others, see Veselovská (1995), Bailyn (1997), Billings (1997), Przepiórkowski & Kupść (1997), Brown (1999), Przepiórkowski (1999), Kosta (2001), Perissutti (2003), Borschev et al. (2006), Dočekal & Kučerová (2013), Yanovich (2013), Gruet-Skrabalova (2013), Dočekal (2017).

Genitive of negation The alternation between structural cases (nominative and accusative) and genitive is grammaticalized in Slavic and Baltic languages. The alternation is diachronically changing; it is optional in contemporary Russian, obligatory in Polish, and practically non-existent in modern Czech, although

it was obligatory in Old Czech at least until 18th century (Lamprecht et al. 1986). I will focus here (as many other researchers) on subject GENITIVE OF NEGATION, demonstrated with (71a)/(71b) from Partee et al. 2011: 136 and object genitive of negation as in (72a)/(72b) from Partee et al. 2011: 137. There are various related genitive alternations, like genitive of intensionality and partitive genitive, but discussing them is clearly beyond the scope of the current chapter (but see Kagan 2007).

(71) a. Otvet   iz   polka   ne prišel.
         Answer-NOM.M.SG from regiment NEG arrived-M.SG
         'The answer from the regiment has not arrived.'

      b. Otveta   iz   polka   ne prišlo.
         Answer-GEN.M.SG from regiment NEG arrived-N.SG
         'The answer from the regiment has not arrived.'

(72) a. Ja ne zametil vodku   na stole.
         I NEG noticed vodka-ACC on table
         'I didn't notice the vodka on the table.' (presuppositional: vodka was there)

      b. Ja ne zametil vodki   na stole.
         I NEG noticed vodka-GEN on table
         'I didn't notice any vodka on the table.' (non-presuppositional: maybe there was none)

In both subject and object genitive of negation, the negated sentence allows the Nom-Acc/Gen alternations, which are triggered by semantic and pragmatic factors. The traditional description following the original Jakobson's insight is (for subject GenNeg) Babby 1980, who claims that the Nom is outside the scope of negation while Gen has a narrow scope with respect to negation. He furthermore correlates this scope reasoning with the Topic/Focus structure and claims that the Nom subject is a topic (outside of the negation scope) while Gen is inside the negation scope (and with an empty topic). Borschev et al. 2010: ex.(6)-(7) offer conclusive evidence that it is not the Topic/Focus articulation that is the decisive factor of GenNeg since it is easy to find topics realized as GenNeg, which goes against the Jakobson/Babby information structure hypothesis.

While Partee & Borschev 2002; Borschev et al. 2010; Partee et al. 2011 disagree with the particular realization of the idea, they follow the main intuition of the previous research, namely that GenNeg is a pragmatically triggered alternation, they come with a new name for it PERSPECTIVAL STRUCTURE. For them, the choice

of the case signals the perspectival center: in (72a), the perspectival center is *vodka*, but in (72b) genitive signals a demotion of *vodka* and the perspective center becomes the location (the table). They furthermore claim that the perspectival center is presupposed to exist (relative to a location). The demoted genitive is then not a center, and they cache this observation as a type shifting of the Gen NP. The type shift involves the shift of the argumental NP (of type $\langle e \rangle$ if it is Acc or Nom) to the predicative type $\langle e, t \rangle$ (see also Kagan 2007). The shift of the NP is accompanied by the shift of its verb. Let me demonstrate their reasoning with an example toy derivation of (parts) of (72a)/(72b) truth conditions. My formalization, of course, follows the spirit of Partee et al. 2011; Borschev et al. 2010, but I simplify and use the σ definite determiner to emulate their presupposition idea. (73) contains the truth-conditions for the Acc marked object which promotes *vodka* as the presupposed perspective center (σ-bound property in (73b) which results in type $\langle e \rangle$), the verb in (73a) remains at the basic $\langle e \rangle$ type function with respect to its object.

(73)　a.　$[\![\text{notice}_1]\!] = \lambda l \lambda x \lambda y [\text{NOTICE}(x, y, l)]$ …x notices y at location l

　　　b.　$[\![\text{vodka}_{Acc}]\!] = \sigma z.\text{VODKA}(z)$ …$\langle e \rangle$ type

　　　c.　$[\![\text{notice}_1([\![\text{vodka}_{Acc}]\!])]\!] = \lambda l \lambda x [\text{NOTICE}(x, \sigma z.\text{VODKA}(z), l)]$

But in genitive version, (74b), *vodka* becomes a property of type $\langle e, t \rangle$, the verb is type-shifted (Borschev et al. 2010 speculate about semantic incorporation), (74a), and the resulting truth-conditions are in (74c). The negation would semantically scope wider than all the arguments, which is in accordance with the syntactic observation that Slavic verbal negation has wide scope over the whole sentence since it licenses neg-words in all argument and adjunct positions. The apparent wide scope of Acc/Nom with respect to negation then results from the presupposition (the perspectival) center. This seems like a reasonable and empirically well-motivated explanation using minimum ad-hoc stipulations.

(74)　a.　$[\![\text{notice}_2]\!] = \lambda l \lambda x \lambda P [\exists y (P(y) \wedge \text{NOTICE}(x, y, l))]$ …x notices a property P at location l

　　　b.　$[\![\text{vodka}_{Gen}]\!] = \lambda z.\text{VODKA}(z)$ …$\langle e, t \rangle$ type

　　　c.　$[\![\text{notice}_2([\![\text{vodka}_{Gen}]\!])]\!] = \lambda l \lambda x [\exists y (\text{VODKA}(y) \wedge \text{NOTICE}(x, y, l))]$

This was a core claim of the research, including at least Borschev & Partee 2002a,b,c, Partee et al. 2011; Borschev et al. 2010 concerning GenNeg. It derives nicely (and by using independently widely accepted mechanisms) the crucial properties of GenNeg: the genitive marked subject or object is not presupposed

and is semantically and pragmatically demoted. Furthermore, it explains some other properties of the whole construction: the verbal semantics is bleached in GenNeg (in many cases close to the presentational sentences) because of the type-shift of the verb. There (of course) remain some partially open issues discussed at length in Partee et al. 2011; Borschev et al. 2010 such as the relationship between subject GenNeg and object GenNeg, various degrees of optionality, the relation of GenNeg to other genitive alternations, etc. But be it as it may, the semantic theory of Partee and colleagues is an excellent example of a careful data analysis combined with a very reasonable semantic/pragmatic approach that illuminates the complicated data patterns with up-to-date formal linguistic tools.

4 Summary

In this chapter, I summarized syntactic, semantic, and pragmatic theories of (not only) Slavic negative polarity items and scalar particles. I tried to summarize the history of ideas in formal Slavistics pertaining to the description and explanation of Negative Polarity Items (and scalar particles). The chapter has shown how a better understanding of Slavic polarity-dependent expressions improves our understanding of the division of labor between syntax, semantics, and pragmatics.

Abbreviations

NEG	negation	SE	clitic *se*
NOT	negation	SG	singular
NPI	Negative Polarity Item	NEG-BODY	neg-word for persons
ACC	Accusative	Q	question particle
FUT	futurum	SDE	Strawson downward entailing
DE	downward entailing		
COMP	complementize	SUBJ	subjunctive
EVEN	unlikelihood scalar presupposition	AUX	auxiliary
		SOLO	likelihood scalar presupposition
AT-LEAST	scalar inference (also) in at-issue	$_uNEG$	uninterpretatble syntactic negative feature

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