Focused Epistemic Adverbs and Scalar Implicatures

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1. Introduction

This paper shows that, in contrast to the common view, epistemic adverbs can occur in the sentence-final position, be accented there and focused. It is argued that it is possible only if the appropriate adverb is the semantically strongest member of the set of focus alternatives, that is, when the asserted proposition entails all its true alternatives. This is required by the proposed Strongest Assertion Constraint, which works together with the covert exhaustivity operator in the derivation.

It has been shown that sentence adverbs like epistemics cannot occur in the sentence-final position (unless they are separated by a comma intonation); see Jackendoff (1972) for English, Belletti (1990) for French, Alexiadou (1997) for Greek, Cinque (1999) for Italian:

(1)   a. *Horatio has lost his mind evidently/probably.   (Jackendoff 1972, 50)

    b. *Jean partira   probablement.   (Belletti 1990, 53)
        Jean   will.leave probably

    c. *O Janis   tha figi   pithanos.   (Alexiadou 1997, 157)
        the John.nom fut go.3sg probably

    d. *Gianni lo merita francamente / fortunatamente /
        Gianni   it   deserves frankly   luckily
        evidentemente / probabilmente / forse.   (Cinque 1999, 31)
        evidently   probably   perhaps

As to Slavic languages, consider the Russian example in (2), the Polish example in (3) and the Czech sentence in (4).

(2) *Jan kupit ètu knigu vozmožno / verojatno.
      Jan buys   the book   possibly   probably

(3) *Jan tę książkę kupi może / prawdopodobnie.
     Jan the book   buys possibly probably

(4) *Jan si tu knížku koupí možná / pravděpodobně.
     Jan self the book   buys possibly probably

This paper focuses on Czech. It is organized as follows. The next section discusses previous approaches to sentence adverbs and shows that they cannot handle certain data with sentence-final epistemics. Section 3 specifies conditions under which epistemic adverbs can occur in the focused sentence-final position. It proposes a semantico-pragmatic analysis, according to which the strongest assertion always must be used. The asserted proposition containing the focused epistemic is grammatical if it entails all its true alternatives. Conclusions are drawn in section 4.

2. Previous approaches

2.1 The syntactic and semantico-pragmatic approach

In the syntactic approach to sentence adverbs - represented, for example, by Jackendoff (1972), Cinque (1999), Laenzlinger (2002) - the ungrammaticality of examples (1)-(4) is accounted for in terms of the structural status of the appropriate adverbs: The discussed examples are ungrammatical since sentence adverbs cannot merge in a low structural position in the sentence.

    As to the semantico-pragmatic approach, Lang (1979) argues that epistemic adverbs are focus-sensitive operators and they themselves cannot be focused and accented. According to Koktová (1987, 1999) and Hajičová, Partee & Sgall (1998), the prototypical position of focus-sensitive adverbs is at the boundary between the background domain and the focus domain. In the same vein, Jacobs (1986, 1988) and Krifka (1992) argue that focusing adverbs must c-command their focus.

    However, certain sentence adverbs can occur in the sentence-final position, as shown by the Italian and Czech example in (5) and (6), respectively.

(5) Gianni lo merita sicuramente/di sicuro.   (Cinque 1999, 180)
     Gianni it deserves surely
     'Gianni deserves it surely.'

(6)   Jan si   tu knížku koupí určitě.
      Jan self the book   buys   certainly
      'Jan will certainly buy the book.'

This shows that the ungrammatical status of examples (1)-(4) is not due to the general impossibility of sentence adverbs to occur in the sentence-final position and be accented there. Note also that *sicuramente* and *určitě* are more or less as high as epistemic adverbs in the adverbial hierarchy, hence data in (5) and (6) pose a problem for the claim that the ungrammaticality of (1)-(4) is due to the height of the adverbial merger.

Addressing this problem, Cinque (1999) proposes that realis mood adverbs like the ones in (5) and (6) are used as focusing adverbs that allow their complement (i.e., the modified constituent) to move across them, as demonstrated below.

(7) $[[_{XP} \ldots X \ldots]_1 \, Adv^0 \, t_1 \,]]$

Concerning the semantico-pragmatic approach, Lang (1979) differentiates between three types of sentence adverbs in German. Adverbs belonging to the first type (A) are, for instance, *möglicherweise* 'possibly' and *wahrscheinlich* 'probably', adverbs of type B are *bedauerlicherweise* 'unfortunately' and *überraschenderweise* 'surprisingly' and adverbs of type C are *tatsächlich* 'really' and *in der Tat* 'certainly'. According to Lang, adverbs belonging to C differ from adverbs of type A and B in the fact that they can be accented and focused. This means that *sicuramente* and *určitě* in (5) and (6) belong to C and adverbs like *možná*, *pravděpodobně* and their equivalents from examples (1)-(4) belong to types A and B.

Now consider the sentence in (8). This example poses a problem for both discussed approaches.

(8)   Jan si   tu knížku koupí jenom možná.
      Jan self the book   buys   only   possibly
      'It is only possible that Jan will buy the book.'

The problem is that *možná* is of type A but it is accented and represents the focus it-self. And in contrast to Cinque's proposal (1999), *možná* is not used as a focusing ad-verb but it is associated with the focus-sensitive *jenom*.

2.2 Veridicality and downward monotonicity

The adverb *určitě* 'certainly' on one hand and adverbs of type *možná/pravděpodobně* 'possibly/probably' on the other have different semantic properties. In contrast to *určitě*, *možná/pravděpodobně* are excluded from environments licensing affective po-larity items. They cannot occur, for instance, in sentences with the question operator and the imperative operator, as shown here for *možná* in (9b) and (10b), respectively.[1]

(9)   a.   Koupí si   Jan (určitě) tu knížku (určitě)?
           buys   self Jan certainly the book   certainly
           'Is it sure that Jan will buy the book?'
      b.   Koupí si   Jan (*možná) tu knížku (*možná)?
           buys   self Jan possibly   the book   possibly

(10) a.   Kup si   (určitě) tu knížku (určitě)!
           buy   self certainly the book   certainly
           'Buy certainly the book!'
      b.   Kup si   (*možná) tu knížku (*možná)!
           buy   self possibly   the book   possibly

According to Giannakidou (1999, 2002), propositional operators like the im-perative and question ones are nonveridical; consider the definition of (non)veridicality in (11), taken from Giannakidou (2002, 5).

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[1] *Možná* is also bad in the sentence-initial position; see (i). In certain cases, however, it can occur there, as shown by (iib). This is a consequence of the fact that this type of *možná* has an additional meaning component giving a suggestion as to a possible answer (see Bellert (1977) for the English *perhaps*).

(i)   * Možná si   Jan koupí tuhle knížku?
          possibly self Jan buys   this   book
(ii) a. Co se to v poslední době děje s Janem?
          What happens with Jan in the last days?
      b. Možná si   koupil tu divnou knížku?
          possibly self bought   the strange book
          'Is it possible that it is a consequence of his reading the strange book?'

(11) (*Non*)*veridicality for propositional operators*
    (i) A propositional operator *F* is veridical iff *Fp* entails *p*: $Fp \rightarrow p$; otherwise *F* is nonveridical.
    (ii) A nonveridical operator *F* is antiveridical iff *Fp* entails *not p*: $Fp \rightarrow \neg p$.

Given the contrast between *určitě* and *možná*/*pravděpodobně* in (9), (10) and in examples (4) and (6), one might ask whether the ungrammaticality of examples with epistemics like *možná*/*pravděpodobně* as in (2)-(4) is due to the presence of a nonveridical operator, for instance, due to a covert illocutionary operator (see Jacobs 1991, Büring 1997, Krifka 1999 for ASSERT). Since illocutionary operators have the whole sentence in their scope and since the following example demonstrates that epistemics like *možná* are grammatical in the background domain of declarative sentences, the appropriate operator should form the tripartite structure and be nonveridical only in the focus domain (in the nucleus).[2]

(12) a. Komu pošle Pavel tu knihu?
        'To whom will Pavel send the book?'
    b. Tu knihu možná   pošle Pavel Jirkovi.
        the book possibly sends Pavel Jirka
        'Pavel will possibly send the book to Jirka.'

For this proposal, however, data like (13) pose a problem because there is an unexpected contrast between the backgrounded (13a) and the focused position (13b) of *možná*.

(13) a. ?? Buď bude Jirka možná číst, nebo půjde na trénink.
           either will   Jirka possibly read or   go   to training
    b. * Buď bude Jirka číst možná, nebo půjde na trénink.
           either will   Jirka read possibly or   go   to training

Specifically, the problem is that *možná* should be equally bad in all positions because exclusive *or* is a nonveridical truth-functional operator, as argued in

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[2] Nonveridicality then would function as the anti-licensor of *možná*-epistemics, like downward-entailing operators excluding positive polarity adverbs in Nilsen (2003); see below. However, in addition to the empirical problem in (13), such an analysis would have to cope with the fact that veridicality is standardly defined for propositional operators only.

Zwart (1995, 288); see (14). This means that the explanation in terms of non-veridicality of the focused position does not work.

(14)   *(Non)veridicality for dyadic operators*
        Let C be a dyadic truth-functional connective. C is said to be *veridical*
        with respect to p [q] just in case pCq $\Rightarrow$ p [pCq $\Rightarrow$ q] is logically valid.
        If C is not veridical with respect to p [q], then C is *nonveridical*
        with respect to p [q].

Concerning the downward-monotonicity approach, Nilsen (2003) argues that epistemics like *možná* are positive polarity items and as such are excluded from downward-entailing contexts. Downward-entailing operators (like e.g. negation) reverse the relation of semantic strength among expressions, the direction of entailment; consider (15), taken from Nilsen (2003, 41).[3]

(15)   *DE function*
        A function *f* is downward-entailing iff whenever *a* is semantically
        stronger than *b*, it holds that *f(b)* is semantically stronger than *f(a)*.

Given this, one might propose that the ungrammaticality of sentences with a focused sentence-final epistemic like (2)-(4) (in contrast to the backgrounded epistemic (12b)) is due to a downward-entailing operator. This proposal, however, also does not work because negative polarity items like *ani za nic* 'no way' are not licensed in that position; see (16).

(16) *Jan   si   tu   knížku koupí ani   za   nic.
      Jan self the book   buys   and.not behind nothing

The following example demonstrates that in fact the context is upward-entailing since (17a) entails (17b); thus showing that downward monotonicity cannot be held responsible for the ungrammaticality of *možná* in the sentence final position.
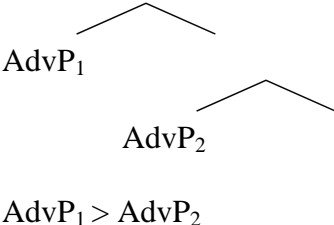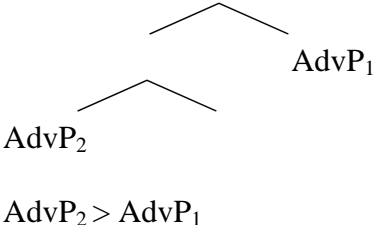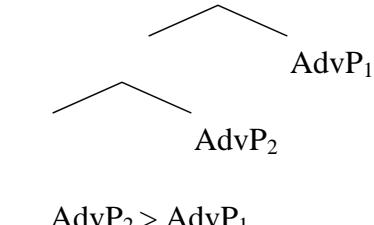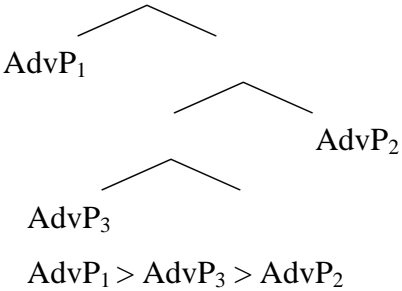
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[3] Krifka (1995, 219) defines semantic strength '$\subseteq$' for all types based on the type t as follows:
    a.   If α, β are of type t, then $\alpha \subseteq \beta$ iff $\alpha \rightarrow \beta$.
    b.   If α, β are of type $<\sigma, \tau>$, then $\alpha \subseteq \beta$ iff for all γ of type σ: $\alpha(\gamma) \subseteq \beta(\gamma)$.

(17) a. Jan si tu knížku koupí v knihkupectví na rohu.
       Jan self the book buys in bookstore on corner
       'Jan will buy the book in the bookstore on the corner.'

    b. Jan si tu knížku koupí v knihkupectví.
       Jan self the book buys in bookstore
       'Jan will buy the book in a bookstore.'

3. The proposal

Let us first consider the syntactic position of epistemics. In the case of Czech non-clausal adverbials, the higher adverbial precedes the lower adverbial in the unmarked case (Biskup 2011). Having said this, we see that only the syntactic structure in (18a) derives the correct order. This means that non-clausal adverbials are merged to the left. Consequently, the grammaticality of *určitě* in (6) and *jenom možná* in (8) cannot be accounted for through right adjunction.

(18) a.

$AdvP_1$

$AdvP_2$

$AdvP_1 > AdvP_2$

b.

$AdvP_1$

$AdvP_2$

$AdvP_2 > AdvP_1$

c.

$AdvP_1$

$AdvP_2$

$AdvP_2 > AdvP_1$

d.

$AdvP_1$

$AdvP_2$

$AdvP_3$

$AdvP_1 > AdvP_3 > AdvP_2$

The following example makes the same point. Since *určitě* precedes the syntactically lowest complement *do Brna*, it cannot be right-adjoined.

(19) Jan mu tu knížku pošle určitě do Brna.
     Jan him the book sends certainly to Brno
     'Jan will certainly send him the book to Brno.'

Given the clause structure of Czech sentences with the backgrounded verb in T, as shown in (20), and the fact that non-clausal adverbials merge to the left, it follows that the epistemics in (4), (6) and (8) must occur in *v*P:

(20)   [CP [MoodP Jan [Mood si][TP tu knížku [T koupí][vP určitě/ jenom možná/*možná]]]]
                 Jan   self   the book   buys   certainly/only possibly/possibly
        'Jan will certainly buy the book.'
        'It is only possible that Jan will buy the book.'

Data with floating quantifiers also show that the epistemics occur in *v*P; consider (21), where *určitě* is sandwiched between two *všechny* 'all'. The right *všechny* represents the base position of the direct object and the left *všechny* marks the *v*P boundary since the moving object has to stop at the edge of the *v*P phase.[4]

(21)   [CP [MoodPJan si [TP ty knížky koupí [vP (všechny) určitě (všechny)]]]][5]
                 Jan self   the books buys   all   certainly all
        'Jan will certainly buy all the books.'

Epistemics like *možná*, *pravděpodobně*, *určitě* are standardly taken to be propositional operators (are of type <st, st> (Kratzer 1981)) and express the strength of the speaker's evidence for the proposition. Although they overtly occur in *v*P, they covertly move to a higher position in the CP phase. This is supported by data with negation, whose projection is outside *v*P. In the unmarked case, epistemics take scope over negation, as shown in (22) (see also Junghanns 2006). If the intonational pattern is manipulated, the reversed scope is also possible in certain cases. More concretely, it is possible only in cases where the adverb is the only overt element c-commanded by the negated verb (where negation as focus-sensitive operator associates with the focused adverb), as in sentence (22a), which could be continued with *nýbrž jenom možná* 'but rather only possibly', in contrast to (22b), where the reversed scope is not possible. Thus, if *určitě* is the only focused element in (22a) and *Jan si tu knížku nekoupí* is backgrounded,

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[4] To exclude right adjunction of the right occurrence of *všechny*, data with a directional PP can be used. Because of lack of space, I do not present them here.
[5] For some speakers, the left occurrence of *všechny* is slightly marked.

určitě scopes over negation. However, if both *nekoupí* and *určitě* are stressed in (22a) (with the rising intonation on *nekoupí*), negation scopes over *určitě*.

(22) a. Jan si tu knížku nekoupí určitě.
          Jan self the book   not.buys certainly
          'It is certain that Jan will not buy the book.'
    b. Z těch knížek si Jan nekoupil možná ani jednu.
          from the books self Jan not.bought possibly and.not one
          'It is possible that Jan did not buy any of the books.'

Following Biskup (2006, 2009), I assume that there is a correlation between the phase structure, tripartite quantificational structure and information structure of the sentence (building on Heim 1982, Partee 1992, Diesing 1992, Chomsky 2000 *et seq*). The CP phase is interpreted as the restrictive clause of the quantificational structure and the background domain of the information structure and the *v*P phase is interpreted as the nuclear scope and the focus domain. Given this correlation, *možná*/*pravděpodobně* (4), *určitě* (6), (*jenom*) *možná* (8), occurring in *v*P, are focused and introduce a set of alternatives, which suits our plans, since we know that they are accented in the sentence-final position.

In examples (6) and (8) the focused adverbs comment on the probability of the modified proposition. The relevant focus alternatives, for instance, to *určitě* 'certainly' include *perhaps*, *possibly*, *maybe*, *probably*. Since sentence adverbs cannot be questioned, it is difficult to create the appropriate context question for these sentences. But it is possible to ask indirectly, using the noun *pravděpodobnost* 'probability': *S jakou pravděpodobností si Jan tu knihu koupí?* 'With what probability will John buy the book?' or using embedding: *Jak je pravděpodobné, že si Jan tu knihu koupí?* 'How probable is that Jan will buy the book?'. Thus, it is a case of new information focus (see also examples in (27) and (28) below).[6]

Biskup (2007, 2011) observes that sentence adverbs like *možná* can occur in the sentence-final position only if they represent the extreme value with respect to the set

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[6] With the appropriate accent pattern, the epistemics in (6) and (8) could also be contrastively (correctively) focused.
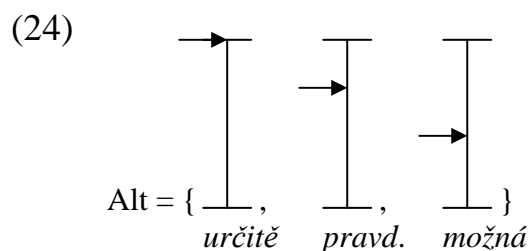
of focus alternatives. However, he does not explain why that is the case and is not spe-cific about how it works. This will be done in the remainder of the paper.

According to Hurford (1974, 410), disjuncts cannot entail each other. More con-cretely, he argues that 'The joining of two sentences by *or* is unacceptable if one sen-tence entails the other; otherwise the use of *or* is acceptable.' This is evidenced by the following examples.

(23)   a. #Jirka je lingvista nebo syntaktik.
       b. #Jirka is a linguist or a syntactician.

It has also been argued that disjunctions introduce sets of propositional alternatives (e.g. Zimmermann 2000, Geurts 2005, Alonso-Ovalle 2008). Tying these two ideas together, Wagner (2013) generalizes Hurford's constraint to all alternative sets and proposes that alternative sets must be pairwise non-redundant. This means that alterna-tives cannot entail each other, which also holds for focus alternatives.

It is well-known that focus alternatives can be ordered according to semantic strength (set relations); see, for instance, Krifka (1995). In addition, alternatives can be represented by a value on a scale. I assume that epistemic adverbs correspond to val-ues on the epistemic (probability) scale, as demonstrated in (24) with the alternative set containing *určitě* 'certainly', *pravděpodobně* 'probably' and *možná* 'possibly'.

(24)

$$\text{Alt} = \{ \; \underset{\textit{určitě}}{|} \; , \; \underset{\textit{pravd.}}{|} \; , \; \underset{\textit{možná}}{|} \; \}$$

The following example shows that the pairwise non-redundance is too strong because a proposition with a higher-probability adverb like (25a) entails the proposition with a lower-probability adverb like (25b).

(25)   a. Pavel certainly sings.
       b. Pavel possibly sings.

In order to derive this fact and the difference between the grammatical cases as (6) – with the maximal value - and the ungrammatical cases as (4) – with the non-maximal value -, I propose that the asserted proposition must entail all its true alternatives; consider the constraint in (26), where p_{assert} stands for the asserted proposition and q for its true alternatives.

(26) *The strongest assertion (TSA)*
      $\forall q_{<s, t>} \in$ Alt to $p_{assert<s, t>}$: $p_{assert} \rightarrow q$

In other words, there cannot be a stronger alternative than the asserted proposition. On the other hand, there can be non-asserted alternatives that are weaker than the asserted proposition. Therefore, the proposition in (6) can have the proposition with *pravděpodobně* or *možná* as its alternative. Thus, after the relevant alternatives are computed (by replacing the focused element according to context, the semantic type), the interface decides whether or not the derivation complies with TSA.

We already know that *určitě* can occur in the focused sentence-final position. Since *určitě* represents the highest value on the epistemic scale of focus alternatives, as shown in (24), TSA is satisfied in cases like (6). Other examples supporting this analysis are shown below; see (27) and (28) from the Czech National Corpus (ČNK), which contain two other cases of focused maximal value epistemics.

(27) a. Context: Například Orwellovu Farmu zvířat jeden nakladatel odmítl s
          odůvodněním, že věc je politicky delikátní. "Zpodobnění vládnoucí
          třídy jako bandy prasat mnoho lidí rozčílí," píše se v posudku.
          "Především ty, kdo jsou v tomto ohledu trochu nervózní,
          For instance, a publisher rejected Orwell's Animal Farm with the reason that it is
          politically problematic. "The depiction of the establishment as a gang of pigs will
          make many people angry," the review says. "Especially those who are somewhat
          edgy in this respect,
      b. a   to jsou Rusové bezpochyby."
          and it   are   Russians without.doubt
          'and it is true about Russians without doubt.'

(28)   a. Context: Zahyne trochu později než jiní dinosauři,
                        It will extinct somewhat later than other dinosaurs
        b. ale zahyne nepochybně.
            but extincts undoubtedly
            'but it will extinct beyond doubt.'

In contrast, in the case of *možná* and *pravděpodobně* in (4), there are stronger true alternatives, at least *určitě*, as demonstrated in (24). Therefore, TSA is not satisfied and these epistemics cannot occur in the focused position.

How does the proposal work in the case of *jenom možná* 'only possibly' in (8)? Since *only* is focus-sensitive and excludes (negates) all other alternatives (e.g. Rooth 1985, Krifka 2006) – here in fact all higher alternatives -, TSA is satisfied and *možná* can occur in the focused position.[7]

Contrary to *možná*, *pravděpodobně* cannot occur in the sentence; as shown in (29). The reason is the inherent incompatibility of the 'low' meaning of *jenom* and the high value of *pravděpodobně*. This is supported by the fact that in the *syn2013pub* corpus of ČNK, there is no occurrence of the string *jenom pravděpodobně*, independently of whether or not it occurs in the sentence-final position.[8] In contrast, there are 14 occurrences of the string *jenom možná* in the corpus.

(29) *Jan si   tu knížku koupí jenom pravděpodobně.
       Jan self the book   buys only   probably

As demonstrated in (30b), if *nanejvýš* 'at most' is used instead of *jenom*, *pravděpodobně* can also occur in the sentence-final position.

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[7] The focused sentence-final *možná* is not bad due to the phonological 'lightness'; see the control sentence (i). Similarly to *jenom*, *dost* 'enough' makes *možná* heavier but the sentence is ungrammatical (because it is not in accordance with TSA).
   (i) * Jan si   tu   knížku koupí dost   možná.
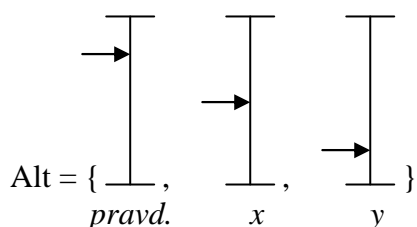   Jan self the book   buys   enough possibly
[8] See also (i) and (ii). With middle values (like *možná*) *jenom* is compatible. In many cases, the value depends on the context and the speaker: In contrast to the Middle Ages, (iiib) is fully acceptable nowadays.
   (i)   John ate only a little/*a lot.
   (ii)   My father works only 2 hours/*20 hours per day.
   (iii) a. What education did he receive?
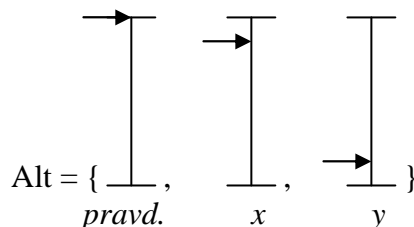   b. He only reached Magister.

(30) a. *Jirka přijde pravděpodobně.
        Jirka comes probably
   b. Jirka přijde nanejvýš pravděpodobně.
        Jirka comes on.highest probably
        i. 'It is at most probable that Jirka will come.'
        ii. 'It is the most probable that Jirka will come.'

Example (30b) is ambiguous between the basic meaning of *pravděpodobně*, as illustrated in (31i), and the shifted meaning, as demonstrated in (31ii).

(31) i. basic meaning   ii. shifted meaning

As to the basic meaning, the probability that Jirka will come has the value 'probably', which is the highest alternative in this case, as shown in (31i), and from the point of view of the speaker, it is somewhat disappointing that the probability is not higher. In the shifted meaning, the value of *pravděpodobně* is shifted to the highest probability, as shown in (31ii). It is, in fact, certain that Jirka will come, which is from the point of view of the speaker satisfying. The difference between these two meanings is that in (31i) *nanejvýš* 'at most' works like the focus-sensitive *only* (thus eliminating stronger alternatives like *určitě*), whereas in (31ii) it is a modifier of *pravděpodobně*, syntactically and semantically analogous to the case (*s*) *nejvyšší pravděpodobností* 'with the highest probability'. In both cases, *nanejvýš* makes from *pravděpodobně* the strongest alternative, hence the asserted proposition entails all its true alternatives, the TSA constraint is satisfied and the sentence with the focused *pravděpodobně* is grammatical.

In (8) *jenom* has the same role as the optional covert exhaustivity operator in sentences with other scalar items (as proposed in the grammatical approach to scalar implicatures, e.g. Fox 2007, Chierchia, Fox & Spector 2009, Chierchia *et al.* 2012, Crnič 2013), with the difference that it is overt. Consider the meaning of the exh(austivity)

operator (from Fox 2007, 79), which is based on the meaning of *only* and where the prejacent (p) is true and all non-weaker alternatives (q) are false:

(32) $[[exh]](A_{<st, t>})(p_{st})(w) \Leftrightarrow p(w) \ \& \ \forall q \in NW(p, A): \neg q(w)$

A closer look reveals that the TSA constraint is very similar to this exhaustivity opera-tor. The question arises whether this operator should be used instead of TSA. There are at least three arguments against this position. First, we need an overt operator since without an overt operator *možná* and *pravděpodobně* are always ungrammatical, as shown by the contrast between the sole *možná*/*pravděpodobně* in (4) and *jenom možná* in (8) and *nanejvýš pravděpodobně* in (30b). If we used the covert *exh*, then we would expect sentences with *možná* like (4) to be grammatical (without additional assump-tions), contrary to the facts. Second, there is a problem with the optionality of *exh*. If it were applicable and optional in cases like (4), there, in fact, could be two different judgements for the sentence, grammatical and ungrammatical. Finally, given what we said above, *exh* cannot handle the contrast between the grammatical maximal-value epistemics like *určitě* and the ungrammaticality of the non-maximal-value epistemics like *možná*. Given this, I conclude that epistemics need a different analysis.

Exh is used to avoid the problem with entailing the weaker proposition - see the discussion of pairwise non-redundance above and (25) - since it strengthens the weaker proposition so that the entailment relation is broken. Thus, by postulating *exh* within the first disjunct, one can successfully analyze apparent violations of Hurford's constraint like (33).

(33)   Mary read some or all of the books.   (Gazdar 1979)

Exh also derives scalar implicatures in sentences like (34b); the sentence is true and all non-weaker alternatives are false. Thus, the sentence has the implicature that Jan did not eat five dumplings.

(34) a. Context: Kolik knedlíků Jan snědl?
          How many dumplings did Jan eat?
      b. Jan snědl čtyři.
          Jan ate   four
          'Jan ate four.'

This contrasts with the ungrammatical example (4), in which non-maximal value epistemics occur. Why do the two types of scalar items in (4) and (34b) not behave parallel in acceptability? Recall that the non-maximal value epistemics *možná* and *pravděpodobně* are grammatical with *jenom* 'only' and *nanejvýš* 'at most'. Let us assume that scalar implicatures are indeed computed in grammar by *exh* (but see also van Rooij & Schulz 2004, Sauerland 2004, Spector 2007 for the neo-Gricean approach). Since *jenom* (*nanejvýš*) works almost in the same way as *exh*, the question is why *exh* does not make *možná* and *pravděpodobně* grammatical in cases like (4).

One might propose that TSA applies before *exh*, that is, before scalar implicatures are calculated. However, this would make scalar items like in (34b) incorrectly ungrammatical. On the other hand, if TSA applies after *exh*, cases like (34b) will be correctly derived but examples with focused non-maximal value epistemics like (4) will be incorrectly grammatical. For this reason, I assume that the TSA constraint applies after *exh* and that *exh* does not apply with epistemics. This will correctly derive all four cases.

As to non-maximal value epistemics without *jenom*/*nanejvýš*, since *exh* does not apply here, non-weaker alternatives are not negated, hence there are true alternatives entailing the asserted proposition (e.g. containing *určitě*), which violates TSA. Second, in the case of non-maximal value epistemics with *jenom* and *nanejvýš*, these operators make from the non-maximal value epistemics the strongest alternative, therefore the asserted proposition entails all its true alternatives and the TSA constraint is satisfied. Third, with maximal value epistemics like *určitě*, no exhaustivity operator (*jenom* or *exh*) is necessary because they themselves represent the strongest alternative and the asserted proposition entails all its true alternatives. Finally, with scalar items like in (34b), *exh* – which applies to the proposition before the TSA constraint applies – ne-

gates all non-weaker alternatives of the prejacent, which again means that the asserted proposition entails all its true alternatives in compliance with TSA.

The crucial difference between TSA and *exh* is that TSA is just a constraint, which does not negate the non-weaker alternatives.[9] Neither can replace the other and they need to work together in the derivation. TSA works like a controller that checks whether an exhaustivity operator – either covert (*exh*) or overt (*jenom*) – applies when it is necessary.

The question remains why *exh* does not apply with epistemics.[10] One possibility is to analyze epistemics as being outside of the scope of *exh*, with the consequence that implicatures cannot be computed upon their scalar alternatives. Since *exh* applies to the prejacent proposition (and the set of alternatives), epistemics then would have to be interpreted outside of the proposition like, for instance, speaker-oriented and utterance-modifying adverbs in Potts (2005). There are data supporting such an analysis. For instance, epistemics *možná* and *pravděpodobně* cannot be embedded in the antecedent of conditionals, as demonstrated in (35); they scope over negation in the unmarked case and they cannot occur in questions and imperatives, as discussed above. If this will prove to be a viable analysis, TSA will have to be modified to be capable to handle propositions enriched with such modifiers.

(35)   Pokud je (* *možná/pravděpodobně*) voják, pak je jeho chování ok.
        if   is   possibly/probably   soldier then is his   behaviour ok
        'If (*possibly/probably) he is a soldier, then his behaviour is fine.'

Another possibility is to analyze epistemics as having a preference for an overt exhaustive operator over *exh*. There is a difference between (36a), with *exh*, and (36b), with the exhaustive *jenom*. In contrast to (36a), the sentence in (36b) also has an epistemic (comparative) meaning component: The speaker knows (believes) not only that Jan drank four beers and not more than that, but crucially he also has the knowledge that there is a certain relevant value that is higher than the asserted one. For instance,

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[9] The rationale behind the TSA constraint could be Grice's (1975) Maxim of quantity (cf. Spector 2007).

[10] In the case of *určitě*, *exh* could apply; it would have no effect since *určitě* represents the highest value on the epistemic scale.

(36b) is appropriate in a situation, where the speaker knows that Jan is used to drink six beers.

(36) a. Jan vypil čtyři piva.
          Jan drank four beers
          'Jan drank four beers.'
      b. Jan vypil jenom čtyři piva.
          Jan drank only   four beers
          'Jan only drank four beers.'

Epistemic adverbs quantify over epistemically accessible possible worlds. Thus, the hypothesis is that epistemicity of epistemic adverbs attracts the epistemic meaning component of the overt exhaustive operator, that is, epistemic adverbs prefer the overt exhaustive *jenom*, with the epistemic meaning component, over the covert, pure exhaustive *exh*.

The proposal that *exh* does not necessarily apply to all scalar items is supported by the following example. It shows that quantified pronouns behave in a way parallel to epistemic adverbs. Therefore, they receive the same analysis.

(37) a. Jan si   koupil všechny.
          Jan self bought all
          'Jan bought all of them.'
      b. *Jan si   koupil některé.
          Jan self bought some
      c. Jan si   koupil jenom některé.
          Jan self bought only   some
          'Jan only bought some of them.'
      d. *Jan si   koupil jenom všechny.
          Jan self bought only   all
      e. *Jan si   tu knížku koupí jenom určitě.   .
          Jan self the book   buys only certainly
      f. Jan si   některé koupil.
          Jan self some   bought
          'Jan bought some of them.'

Given its semantic properties, the universal *všechny* 'all' behaves like the maximal-value epistemic *určitě*; the asserted proposition entails all its true alternatives, satisfying TSA, as shown by the grammatical (37a). In the case of the weak quantifier *něk-*

teré 'some', the sentence is bad - as with the epistemic *možná* -, suggesting that *exh* does not apply, with the consequence that TSA is violated; see (37b).[11] This contrasts with cases like (34b), where *exh* applies.

The focus-sensitive *jenom*, associated with *některé*, makes the sentence grammatical since it eliminates the stronger alternatives, analogously to the case of *jenom možná*; consider (37c). However, *jenom* cannot associate with the universal *všechny* (37d) because of their inherent incompatibility, which is parallel to the ungrammatical (37e) and similar to the case of *jenom pravděpodobně* in (29) and to the examples in footnote 8. Since TSA cares about alternatives introduced by the focus, then if *některé* occurs in the background, the sentence is grammatical (37f), as with the backgrounded *možná* in (12b).

4. Conclusion

It has been shown that epistemic adverbs can merge in the *v*P phase, occur in the sentence-final position and be focused there. In that case, they observe the proposed TSA: since they are the semantically strongest member of the set of focus alternatives, the asserted proposition entails all its true alternatives. It has been shown that TSA successfully handles the difference between the grammatical maximal-value epistemics like *určitě* and the ungrammatical non-maximal value epistemics like *možná*. The non-maximal epistemics can be focused only if they get help from an overt operator and become the strongest focus alternative. The reason of the difference in the grammati-

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[11] The reason for the ungrammaticality of (37b) is not the out-of-the-blue status of the sentence; (37a-d) receive the same grammatical judgements if an appropriate context is built (e.g. students, including Jan, are expected to buy several books for their courses). The reason for the ungrammaticality of (37b) also cannot be the lack of a head noun; see (34b), (37c) and also (i), where the same pattern emerges with the pronoun *někdo*, which does not function as a modifier.

  (i) a. Ty knížky si   koupil jenom někdo /   * někdo.
       the books self bought only   somebody / somebody
       'The books, only a few bought.'

     b. Ty knížky si   někdo   koupil.
       the books   self somebody bought
       'The books, someone bought.'

cality between the backgrounded and the focused position of non-maximal epistemics is that TSA only cares about alternatives introduced by the focus. Quantified pronouns support the proposed analysis because they behave in a parallel fashion to the epistemic scalar items. It has been argued that the covert exhaustivity operator does not apply to all scalar items and that it cannot replace TSA. Instead, TSA and the exhaustivity operator need to work together.

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