# Negative properties of quantifiers in English and Swedish

Eva Klingvall[1]
Fredrik Heinat[2]

**Abstract:** In this paper we report the results from two small-scale studies on monotone decreasing (negative) quantifying expressions (QEs) and their negative polarity properties. Some approaches to QEs view polarity item licensing and clause polarity (affirmation/denial) as distinct phenomena. Here, we investigate if this distinction holds for monotone decreasing QEs. In two studies (one on English and one on Swedish), we tested to what extent the abilities of QEs to license negative polarity items (NPIs) and to give rise to clause level denials go hand in hand. Native speakers of English and Swedish rated sentences with quantified subjects (e.g. *few, not all*) and NPIs (e.g. *yet, until*) or polarity sensitive material. The results show that both dimensions of negativity are subject to variation within each language but seem to follow each other to a high degree across the two languages, and that QEs with the same logical properties can still be negative to different degrees.

**Key words:** Negative Polarity Item, clause level denial, monotone decreasing quantifiers, acceptability judgements, negative strength.

## 1. Introduction[3]

Negative quantifying expressions (QEs) such as *few, not all, not many* are known to differ from positive QEs such as *a few, almost all, many* in their discourse focus properties. More specifically, negative QEs make available at the discourse level not only the set of entities for which some property holds, (1a) below, the REFERENCE SET (REFSET)

in Moxey and Sanford's terms (1987), but also the set of entities for which the property does not hold, (1b), the COMPLEMENT SET (COMPSET). Positive QEs, in contrast, lack the ability to switch focus from the REFSET, (2a), to the COMPSET, (2b).

> (1)   Few students attended the lecture.
>       a. They listened very attentively.
>       b. They stayed at home instead.

> (2)   Many students attended the lecture.
>       a. They listened very attentively.
>       b. # They stayed at home instead.

The exact reason why negative but not positive QEs can make the COMPSET salient at the discourse level is not entirely clear. One type of explanation is offered by Moxey, Sanford and Dawydiak (2001). The authors argue that negative QEs give rise to the denial of a supposition at the clause level, similarly to sentence negation (see Clark 1976). Sentences that express denials contrast with sentences expressing affirmations, for instance, in that the former appear with positive tag-questions (e.g. *The students didn't attend the lecture, did they?*), while the latter appear with negative tag-questions (e.g. *The students attended the lecture, didn't they?*). Thus, the idea is that for a sentence like (1) above, the use of *few* implies that a larger number of students were expected to attend the lecture, but that this expectation has not been met. There is therefore a discrepancy, a SHORTFALL, between the number of students expected to attend and actually attending. In such cases, the attentional focus is easily turned to those not attending, i.e. the COMPSET. Since, by definition, both negative QEs and sentence negation are monotone decreasing (see discussion below), it seems reasonable to tie this logical (monotonic) property of QEs to their ability to give rise to denials at the clause level and thereby COMPSET focus. It turns out, however, that the properties are not always linked: not all negative QEs induce COMPSET focus and COMPSET focus can in some cases appear with QEs that are not monotone decreasing. In subsequent work, Moxey, Sanford and Dawydiak therefore separated the notions of QE polarity and clause polarity (Moxey *et al.* 2001; Sanford, Dawydiak and Moxey 2007). The purpose of the present paper is to explore the relation between these two concepts of polarity using speaker judgement data (see Sailer 2007, on the need for judgement data). In two small-scale studies, we investigated how a number of QEs in English and Swedish were rated by native speakers in relation to polarity item licensing and clause polarity. In brief, we found that these are closely related: when there is variation in the data regarding clause level polarity, there is also variation in polarity item licensing.

The structure of the paper is as follows. In the next section, we look at the notion of monotonicity and the licensing of Negative Polarity Items. After that we discuss focus properties of QEs and clause polarity. We then present the two studies. The paper ends with a discussion.

## 1.1. Monotonicity

Quantifying expressions can be divided into different categories depending on their logical properties. QEs are either monotone increasing, i.e. positive by definition, or monotone decreasing, i.e. negative by definition (see Barwise and Cooper 1981: 184ff)[4].

(3)  a. A quantifier Q is MONOTONE INCREASING (mon↑) if for any
     set x  Q, Q also      contains all the supersets of x.
     b. A quantifier Q is MONOTONE DECREASING (mon↓) if for any
     set x  Q, Q also      contains all the subsets of x.

If we apply the definitions in (3) to language, we get the following (*ibid.*):

(4)  Let VP1 and VP2 be two verb phrases such that the denotation of
     VP1 is a subset of the denotation of VP2. Then NP is mon↑ if (i)
     holds, and mon↓ if (ii) holds:
     a. If NP VP1, then NP VP2.
     b. If NP VP2, then NP VP1.
     If neither (a) nor (b) holds, NP is nonmonotone.

On the basis of (4), we can conclude that *many* is a monotone increasing (positive) QE, since the entailment is from a set to the superset, and that *not many* is a monotone decreasing (negative) QE, since the entailment is from the set to a subset:

(5)  VP1 = *wearing yellow socks* is a subset of VP2 = *wearing socks*
     a. If most students wear yellow socks, then most students wear
     socks.
     b. If not many students wear socks, then not many students
     wear yellow socks.

Monotone increasing and decreasing environments differ linguistically in that so-called NEGATIVE POLARITY ITEMS (NPIs hereafter) are typically licensed in monotone decreasing environments, but not in monotone increasing ones (Klima 1964, Ladusaw 1980). NPI licensing is therefore sometimes used as a diagnostic for the monotonic properties of QEs (see Moxey *et al.* 2001, Sanford *et al.* 2007).

---

[4] Some QEs are neither monotone increasing nor decreasing. An example of such a nonmonotone QE is *exactly n.* These will not be further discussed in this paper.

### 1.2. NPIs and the scale of negativity

There is an extensive literature on NPIs (see among many others Brandtler 2012, Chierchia 2013, von Fintel 1999, Gajewski 2011, Giannakidou 1998, Israel 2011, Ladusaw 1980, van der Wouden 1997, Zwarts 1998). Since the focus in this paper is on negative QEs and NPIs, in the following, we discuss works arguing for a connection between the degree of negativity and NPI licensing. NPIs can be classified into (at least) three different categories on the basis of their licensing conditions. Depending on how negative a context they require to be licensed, they are *weak*, of *medium strength*, or *strong*[5] (see among others van der Wouden 1997, Zwarts 1998).

Expressions that license NPIs can thus be negative to different degrees (van der Wouden 1997; Zwarts 1998). Van der Wouden (1997: 105) uses De Morgan's laws as the basis for his scale of negativity:

(6)    De Morgan's Laws
       A: not (A or B) = not A and not B; and
       B: not (A and B) = not A or not B

Without going into details here, depending on how many of De Morgan's Laws, and to what extent (as implication or as equivalence) an expression complies with them, van der Wouden (1997) arrives at a scale with three degrees (see also Zwarts 1998):

(7)    Van der Wouden's scale of negative expressions ('< 'means less negative than)
       a. Monotone decreasing expressions (subminimal negation) <
       b. Anti-additive (minimal negation) and Antimultiplicative expressions <
       c. Antimorphic expressions (classical negation)

An expression higher up on the scale will have all the properties associated with the lower stages too. In other words, all negative expressions are monotone decreasing, but some are, in addition, anti-additive, antimultiplicative or antimorphic. Sentential negation is an example of the strongest type of negation (antimorphic), while many QEs are of the weakest type (monotone decreasing). Below is an example of how the monotone decreasing QE *few* complies with the laws in (6) (from Zwarts 1998: 181):

(8)    **Law A**
       Few trees will blossom or will die → Few trees will blossom and few trees will die

---

[5] The terms *weak, strong* and *superstrong* are sometimes used instead.

> Few trees will blossom and few trees will die ↛ Few trees will blossom or will die
> **Law B**
> Few trees will blossom and will die ↛ Few trees will blossom or few trees will die
> Few trees will blossom or few trees will die → Few trees will blossom and will die

According to van der Wouden (1997), the negative strength of an expression is directly related to its ability to license NPIs of different types (see also Zwarts 1998):

> (9)   a. Strong NPIs are licensed in antimorphic contexts: e.g. *lift a finger, do a thing.*
> b. Medium NPIs are licensed in anti-additive and antimultiplicative contexts: e.g. *until, yet.*
> c. Weak NPIs are licensed in monotone decreasing contexts: e.g. *any, anymore.*

In other accounts, it is not so much the negative strength of the licenser that plays a role for the licensing of NPIs of different strength, but, for instance, what additional implicatures are taken into account when they are licensed (for a recent analysis, see Gajewski 2011). It seems quite clear that while the negative strength of expressions can be determined objectively on the basis of De Morgan's Laws, NPI licensing is much less clear-cut. As will become clear when we look at the results from our studies, there is variation between speakers as to whether they think NPIs are well-formed or not in different negative contexts.

After this short discussion of NPIs and their licensing conditions, we again look at properties of QEs.

### 1.3. Focus properties of quantifiers

Returning to the discussion in the introduction about the focus properties of QEs, the general pattern is that negative QEs focus the COMPSET and positive QEs focus the REFSET. However, there are exceptions to this general pattern. Some negative QEs focus the REFSET rather than the COMPSET, despite being negative. In a series of production experiments, Moxey *et al.* (2001) found that participants provided continuations referring to the COMPSET to a lower degree when the given beginning of the sentence included the QE *at most* than when it included the QE *no more than*, as in (10) (*ibid.*).

> (10)    At most 10 / No more than 10 of the MPs went to the meeting...

According to Moxey *et al.* (2001), the reason for this difference between the two QEs, which are both monotone decreasing, is that only *no more than* gives rise to a denial. Denials stand in contrast to affirmations. In simple terms, the affirmation-denial contrast corresponds to the denial of a proposition: p = affirmation, and ¬p = denial. One test for determining whether an assertion is an affirmation or a denial is the polarity of an attached tag-question. The polarity of the tag-question is the opposite of the polarity of the assertion. According to Moxey *et al.* (*ibid.*), the QE *no more than* gives rise to a denial since it combines with a positive tag-question in sentences like (11a) (see also Sanford *et al.* 2007). With the QE *at most*, the opposite holds. The sentence in (11b) is well-formed with the negative tag.

> (11) a. No more than 10 of the soldiers are overweight, are they?
>      b. At most 10 of the soldiers are overweight, aren't they?

From sentences like (11), it seems clear that QE polarity and clause polarity do not always go together. In addition to the test with tag-questions, there are other tests for determining the polarity of an assertion. We present those used in the studies in the next section.

### 1.4. Clause level polarity: Affirmation *vs* Denial

As explained above, standard tag-questions[6] are one way to test whether a proposition is an assertion or a denial. Sentential negation is the paradigm example of denial. As illustrated in (12), the polarity of the tag is not dependent on what we can infer from the sentence but is, on its standard use, only dependent on the polarity of the clause. We interpret John as not being happy in both (12a) and (12b), but only in the latter is a positive tag well-formed.

> (12) a. John is unhappy, isn't he?          **affirmation**
>      b. John is not happy, is he?           **denial**

Another test for determining the polarity of a proposition is coordination. While denials coordinate with *and neither*, affirmations coordinate with *and so* (Klima 1964):

> (13) a. John is (un)happy, and so is Liza.       **affirmation**
>      b. John is not happy, and neither is Liza.  **denial**

As we established above, monotonicity is a logical property of a QE, but whether the use of a QE makes a proposition an affirmation

---

[6] Tags of the same polarity can be used with other meanings, and there are dialectal differences in the use of tags in English (see Huddleston and Pullum 2002: 892).

or a denial is not a categorical distinction. That is, it seems to be a matter of judgement rather than a logical consequence, whether it is the positive or the negative tag that is well-formed, and whether coordination is possible with *and so* or with *and neither*. In the two studies we have conducted, we investigate how speakers judge these types of structure. More specifically, we look at a number of QEs as potential licensers of NPIs of different strength and investigate whether these QEs give rise to denials or affirmations.

## 2. The studies

In two small-scale studies (one on English, one on Swedish) we investigated to what extent NPI licensing and clause-level denial go hand in hand. We tested whether certain QEs license NPIs of different strength, and whether these QEs are well-formed with positive and negative tags, and in coordination structures for denials and affirmations.

The two studies were conducted in parallel. Both of them consisted of questionnaires distributed via e-mail to the participants. The studies are very simple in their design, with a limited number of participants, and only descriptive statistics will be presented in the results. We regard the studies as a first step towards larger, more controlled, studies. We start with the study on English QEs.

### 2.1. English QEs and negative polarity

We were interested in seeing the behaviour of two monotone decreasing QEs that are very similar in meaning but which Sanford *et al.* (2007) claim differ according to whether they give rise to denials or affirmations at the clause level, namely *at most* and *not more than*. We also wanted to look at the relevance of overt negation versus implicit negation. In addition to the pair *at most* and *not more than*, we therefore also included the meaning pair *few* and *not many*.

### 2.1.1. Participants

The experiment consisted of two parts, each of which had twelve participants. Seven participants completed both parts and ten participants completed only one of the parts[7]. In total, there were thus seventeen participants (5 female and 12 male), all native speakers of English, completing one or two parts of the experiment.

---

[7] We do not see this as a problem since the study is too small for us to draw any conclusions about the behaviour of any particular participant.

### 2.1.2. Material and method

In addition to the four monotone decreasing QEs we were interested in, we included two monotone increasing QEs, to check that the linguistic material used was polarity sensitive.

(14) a. Monotone decreasing: *at most n, few, not many, not more than*
     b. Monotone increasing: *at least n, many*

To investigate how good a licenser of NPIs of varying strength the different QEs are, we included two NPIs from each category, weak, medium and strong (van der Wouden 1997).

(15) a. Weak NPIs: *anymore, any*
     b. Medium NPIs: *until, yet*
     c. Strong NPIs: *do a thing, lift a finger*

The weak NPIs were included since they are used by Moxey *et al.* (2001), but we expected them to be fully licensed by all negative QEs.

Clause polarity (affirmation *vs* denial) was tested by means of tag-questions (positive and negative) and coordination structures (*and so* vs *and neither*).

The sentences were formed on the following patterns:

(16) **Weak NPIs**
     a. QE students come here anymore.
     b. QE students have read any of these books.

(17) **Medium NPIs**
     a. QE students have been there yet.
     b. QE students left until the party was over.

(18) **Strong NPIs**
     a. John didn't care about the exam and in fact QE students lifted a finger to study for it.
     b. The teacher couldn't get the beamer to work and QE students did a thing to help.

(19) **Tag-questions**
     a. QE teachers were late, were they?
     b. QE students were late, weren't they?

(20) **Coordination**
     a. QE organisers were late, and neither were the participants.
     b. QE participants were late, and so were the organisers.

All six QEs appeared once in all different conditions and the participants read all sentences. The material was divided into two parts, sent out in separate e-mails. The first part tested the behaviour of all QEs

with weak NPIs and with both types of tag-question and coordination structure. There were 36 sentences in total in this part. The second part included sentences with medium and strong NPIs, 24 sentences in total. The task was identical in both parts: the participants were asked to indicate whether they thought the sentences sounded good or bad. They were also told that they could add comments to clarify their judgements if they felt that was necessary. Unlike in Sanford *et al.* (2007), each sentence was judged in isolation, rather than as a choice between a positive and a negative tag, for instance. In this way, we avoided problems of forced choice.

### 2.1.3. Results for English QEs

The total number of responses for each condition is twelve, except in three cases where one of the participants failed to respond, see Figure 1. The monotone increasing QEs (*many* and *at least*) were judged as expected in all tests for polarity. That is, all sentences with these QEs were rated as ill-formed with NPIs, and with positive tag-questions and in coordination using *and neither*[8]. As the monotone increasing QEs were included as a control and they behaved as expected, we will not discuss them further in this paper.

Looking at the QEs and their licensing of NPIs, we see in Figure 1 that the QE *at most* licences weak NPIs to some extent (although not fully), but is generally not good with either medium or strong NPIs. The other three QEs behave as expected of negative QEs: they all license weak NPIs, and to some extent, also medium and strong ones. Of these three, the QE *not more than* is a somewhat weaker licenser and *not many* is the strongest.

When it comes to affirmation *vs* denial, the results show that *at most* largely follows the pattern for affirmations with regard to tag-questions, although there were quite a few good ratings with positive tags. *At most* also gives rise to affirmations in the coordination test. The QE *not many*, on the other hand, gives rise to denials in both tests. Interestingly, the QE *few* does not clearly give rise to either an affirmation or a denial with regard to tag-questions, or with regard to coordination. The QE *not more than* largely follows the pattern for denials with regard to tag-questions, although there were quite a few positive ratings with negative tags. With regard to coordination, however, *not more than* does not clearly have the pattern of either an affirmation or a denial.

---

[8] One participant accepted sentences with a positive tag-question and a positive QE, though the participant commented on the structure that it "felt more emphatic" than with a negative tag-question, see footnote 6.
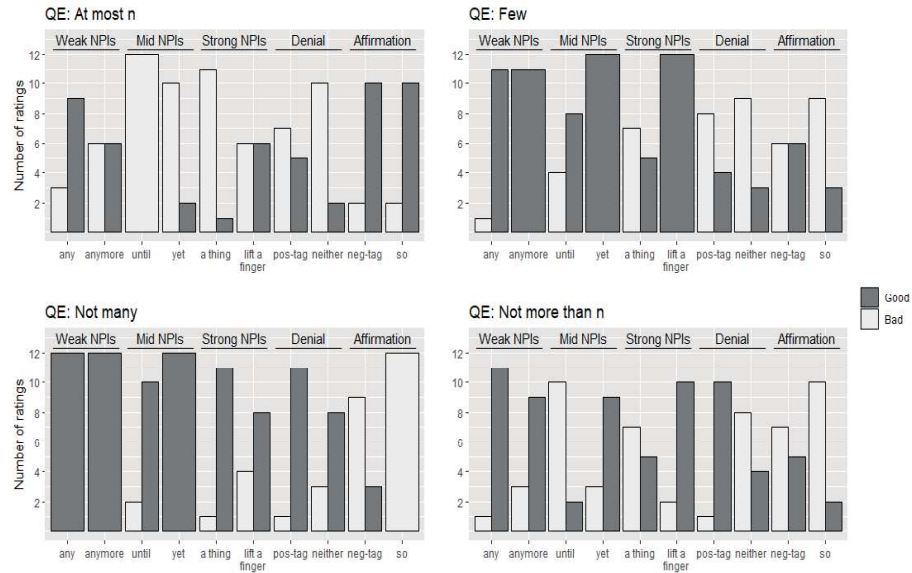
Figure 1: The results for the English QEs

## 2.1.4. Discussion of the results on English QEs

The negative QEs investigated in this study are all at the weakest end of the scale of negativity: they are monotone decreasing. As such, they should license only the weakest type of NPI, according to van der Wouden (1997). As seen in Figure 1, however, they range from barely licensing weak NPIs (*at most*), to licensing even strong NPIs (*not many*). The two pairs of QEs that have similar meaning also divide into two groups when it comes to NPI licensing. *At most* and *not more than* were both judged as bad in many cases (although the former more than the latter), while *few* and *not many* were mostly judged as good with NPIs. In this study, thus, the overt presence of negation did not make QEs stronger NPI licensers. Based on these limited results, we suggest that the QEs investigated can be ordered on a scale from most 'negative' to least 'negative' in the following order with regard to NPI licensing ('>' means more negative than):

(21)  Scale of negativity based on NPI-licensing
      *not many > few > not more than > at most*

Turning to clause polarity, the tests give fairly consistent results for two of the QEs but not for the other two. The QE *not many* gives rise to denials at the clause level: positive tags and coordination

with *and neither* were rated as well-formed, while negative tags and coordination with *and so* were rated as ill-formed. The opposite pattern was found for *at most*: it was judged as well-formed in affirmation structures, and ill-formed in denial structures. For both *few* and *not more than*, on the other hand, the results are much more difficult to interpret and do not clearly point to them giving rise to either denials or affirmations. If we compare them, however, *not more than* appears to lean more towards denials than *few* does. The resulting scale for clause polarity is therefore the following:

(22) Scale of denial based on tag-questions and coordination structures
*not many > not more than > few > at most*

Comparing the two scales in (21) and (22), we see that the QEs are in the same order; the QE that licenses NPIs to the highest degree is also the QE that is most likely to make the clause a denial, and the QE that licenses NPIs to the lowest degree is the QE that is least likely to make the clause a denial. Recall that Sanford *et al.* (2007) use NPIs as a test for QE polarity, and use tag-questions and coordination patterns as tests for clause polarity (see also Moxey *et al.* 2001). Given that *at most* is a monotone decreasing QE but still does not fully accept even weak NPIs, we question whether NPI licensing can be considered a categorical diagnostic for QE polarity. Rather it seems to take into account degrees of negativity within the category of monotone decreasing QEs, in a similar fashion to the tests for clause polarity. In the next section, we turn to Swedish and explore the behaviour of the translation equivalences of the English QEs in Swedish.

## 2.2. Swedish QEs

For the study on Swedish, we looked at the translation equivalents of the QEs in the study on English. We also used the same tests as for English: NPIs, tag-questions and coordination structures. When it comes to NPIs, however, we only tested medium and strong ones for Swedish. The most common weak NPIs *något* ('any') and *någonting* ('anything') can both be used as non-NPIs, corresponding to 'something'. To ensure that these elements have an NPI reading, a more complex design of the sentences would have been necessary. For English, weak NPIs were included since they had been discussed in other studies on English but we expected them to be fully licensed by all negative QEs. The studies on English and Swedish were conducted in parallel, but if we had had the results from the English study already, we might have included weak NPIs in the study on Swedish too.

### 2.2.1. Participants

Ten native speakers of Swedish completed each part of the study. Eight of the participants were identical in the two parts, and two completed only the first part, and two only the second part. In total, thus, 12 speakers (7 female, 5 male) took part in the study.

### 2.2.2. Material

In order to be able to make comparisons between the two languages, the Swedish QEs we investigated were translation equivalents of the English ones. The Swedish QEs are therefore similar to the English ones that we used both with regard to meaning and to overt versus covert negation.

(23) a. Monotone decreasing: *få* ('few'), *högst n* ('at most n'), *inte mer än n* ('not more than n'), *inte många* ('not many')
b. Monotone increasing: *många* ('many'), *minst n* ('at least n')

Five NPIs, two of medium strength and three strong ones, were selected from a study on Swedish NPIs (Rosqvist 2004, see also Brandtler 2012 and Teleman, Hellberg, and Andersson 1999, vol IV: 187ff). Rosqvist (2004) looked at the number of contexts the different NPIs were found in, and, based on this, determined that the NPIs can be categorized as weak, medium or strong.

(24) a. Medium NPIs: *ens* ('even'), *längre* ('anymore')
b. Strong NPIs: *ett rött öre* ('a red cent'), *så pjåkig* ('so bad'), *förrän* ('until')

As for English, tag-questions and coordination were used to test for clause polarity, i.e. affirmation *vs* denial. The tag-questions we used look very similar to their English counterparts. The coordination alternatives are *också* ('too') for affirmations, and *heller* ('either') for denials. The sentences tested were formed on the following patterns:

(25) **Medium NPIs**
a. QE studenter går dit längre.
'QE students go there anymore.'
b. QE studenter går ens på föreläsningarna.
'QE students go even to the lectures.'

(26) **Strong NPIs**
a. QE studenter gick hem förrän efter föreläsningen.
'QE students went home until after the lecture.'
b. QE tentaresultat var så pjåkiga.
'QE exam results were so bad.'

   c. QE studenter hade ett rött öre.
   'QE students had a red cent.'

(27) **Tag-questions**[9]
   a. QE studenter klarade tentan, gjorde de?
   'QE students passed the exam, did they?'
   b. QE studenter klarade tentan, gjorde de inte?
   'QE students passed the exam, did they not?'

(28) **Coordination**
   a. QE studenter var på introdagen och inte många lärare heller.
   'QE students were at the induction day and not many teachers either.'
   b. QE studenter var på introdagen och många lärare också.
   'QE students were at the induction day and many teachers too.'

All six QEs appeared once in all different conditions and the participants read all sentences. As in the study on English, the material was divided into two parts, sent out in separate e-mails. In the first part, consisting of 36 sentences, all NPIs except *ett rött öre* ('a red cent') were tested as well as the coordinating structures. In the second part, consisting of 18 sentences, the strong NPI *ett rött öre* and the tag-questions were tested. The task and the instructions were the same as in the study on English QEs.

### 2.2.3. Results for Swedish QEs

  The total number of responses to each sentence was ten. As in the English study, the monotone increasing QEs (*många* 'many' and *minst* 'at least') behaved as expected: sentences with those were judged as bad with NPIs, negative tags and in coordination with *heller* ('either'). We will not discuss these positive QEs any further.
  Regarding tag-questions, we received comments from two participants saying that they preferred the tags to also include a pronoun, as in (29) (rather than (27)). At least one of them had read the sentences as if they contained the pronoun.

(29) Tag-questions with pronoun
   a. QE studenter klarade tentan, gjorde de det?
   'QE students passed the exam, did they (do) that?'
   b. QE studenter klarade tentan, gjorde de inte det?
   'QE students passed the exam, did they not (do) that?'

---

[9] An alternative way of forming tags is in the form: *visst gjorde de*? ('surely they did?'). In this case, the main clause and the tag have the same polarity. Speakers vary as to whether they prefer this type or the type given in (27).

From the comments it was also evident that some participants were not familiar with the strong NPIs *pjåkigt* ('so bad') and *ett rött öre* ('a red cent'). The sentences with *pjåkigt* were almost uniformly rated as bad (thus also by those who were familiar with the item), as seen in Figure 2. We believe this to be due to lexical properties of the NPI rather than a general failure of licensing, as the other strong NPIs are licensed to a higher degree. We will therefore not include this NPI in the discussion. Regarding *ett rött öre* ('a red cent'), we received comments from some participants saying that they had interpreted the expression literally rather than as an idiomatic NPI. Since the literal meaning makes no sense, the sentences were most likely judged as ill-formed. It is therefore possible that some of the negative judgements are due to factors other than licensing failure. On the other hand, for those sentences that are rated as well-formed we can be quite certain that they test what we intended them to do.

Starting with the licensing of NPIs, we see in Figure 2 that the QE *få* ('few') was judged as good with the medium strength NPIs *ens* and *längre*, and that just over half of the ratings for the strong NPI *ett rött öre* were good. The other strong NPI, *förrän* ('until'), was not accepted by anyone however. The QE *högst* ('at most') received mostly good ratings for the medium strength NPIs (although *längre* to a lesser extent). Just under half of the participants accepted the strong NPI *ett rött öre* with this QE and no one accepted the other strong NPI *förrän* ('until'). The QE *inte mer än* ('not more than') was judged as good with both the medium strength NPIs. The sentences with strong NPIs received more or less the same number of good and bad ratings. Finally, the QE *inte många* ('not many') had similar results to *inte mer än* for strong NPIs but was not generally rated as well-formed with the medium strength NPI *ens*.

When it comes to clause polarity, the results were the following. The QEs *få* ('few'), *inte mer än* ('not more than') and *inte många* ('not many') all gave rise to denials in the coordination tests: coordination with *heller* was judged as good and coordination with *också* was judged as bad. For the QE *högst*, the pattern is less clear since there were many positive ratings for both denial and affirmation (although fewer for affirmation). Regarding tag-questions, *inte många* ('not many') also gave rise to denials, while the results for the other three QEs are more difficult to interpret. That is, both the positive and negative tags were generally rejected although with *få*, negative tags were rated as good to some extent.
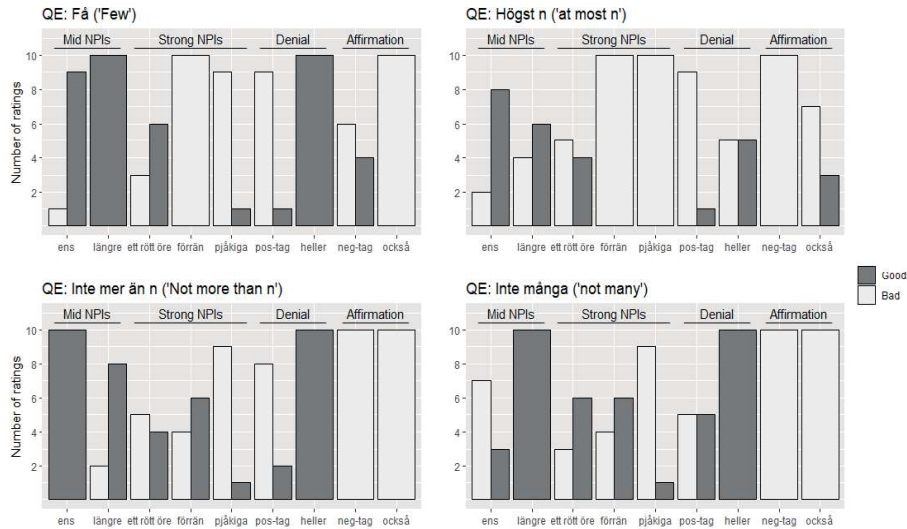
Figure 2: The results for the Swedish QEs

## 2.2.4. Discussion of the results on Swedish QEs

As in the study on English, the study on Swedish QEs shows that monotone decreasing QEs vary in their ability to license NPIs. Although the QEs investigated are of the least negative type (see the scale of negativity in (7)), they license both medium strength and strong NPIs to some extent. Regarding NPI licensing, the QEs that contain an overt negative marker appear to be more negative than those without one.

> (30)  Scale of negativity based on NPI-licensing
> *inte många* ('not many'), *inte mer än* ('not more than') > *få* ('few') > *högst* ('at most')

The QEs also vary as to what clause polarity they give rise to. Coordination gives a pattern in which all QEs except *högst* clearly give rise to denials, while *högst* leans more towards affirmation, although there is variation in the judgements for this QE. When tag-questions are also taken into account, the picture is less clear. Only *inte många* clearly gives rise to denials, while the other QEs have more varied ratings.

> (31)  Scale of denial based on tag-questions and coordination structures
> *inte många* ('not many') > *inte mer än* ('not more than') > *få* ('few') > *högst* ('at most')

Comparing the two scales, we see that in Swedish too, the QEs are in the same order; the most negative QE is also the QE that to the highest degree makes a clause a denial, and the least negative QE is the QE that makes a clause a denial to the least degree. Again, we need to bear in mind that this too is a very limited study, but the correspondence we find between the two scales, is a further indication that the relation between NPI licensing and clause polarity needs further investigation. Furthermore, both the QEs with overt negation (*inte många* and *inte mer än*) are placed further to the negative end of the scale than the ones without (*få* and *högst*) in both cases. In the final section we look at the two studies together and bring the paper to a conclusion.

### 3. General discussion and conclusion

The aim of the studies presented in this paper was to explore the negative behaviour of a number of monotone decreasing QEs in English and Swedish, using data from acceptability ratings. In two small-scale studies, one on English and one on Swedish, participants rated sentences with quantifying expressions and polarity-sensitive items of different types and strength. The background for the studies was the two dimensions of negativity discussed by Moxey *et al.* (2001). On the one hand, QEs can be positive or negative depending on whether they license NPIs, according to the authors (see also Sanford *et al.* 2007). On the other hand, QEs can give rise to affirmations or denials at the clause level, and this is diagnosed via tag-questions and different coordination structures. Crucially, the latter property (affirmation *vs* denial) is taken to be imperative for the discourse focus properties of QEs, that is, whether they focus the set of entities for which some property holds, or whether they can also focus the set for which the property does not hold.

Despite claims in the literature that NPIs are licensed in monotone decreasing environments, we found that that is not always the case. For English, for instance, we found that even weak NPIs were not fully licensed by the monotone decreasing QR *at most*. On the other hand, medium strength and strong NPIs were licensed to some degrees in both languages even though the QEs are of the weakest licensing type. Similar variation in ratings was also found for the sentences testing for clause polarity. Looking at NPI licensing and clause polarity tests together, a fairly stable ordering between the QEs appears with *not many*/*inte många* as the most negative QE, the QE *at most*/*högst* at the other end of the scale, and the other two QEs in between. The finding that the QEs are ordered in the same way within each language calls for a more elaborate investigation of the relation between NPI-licensing, which thus does

not seem to be only a matter of a QE's downward monotonicity, and clause polarity, which does not seem to be a categorical either/or distinction according to the results.

Although there was variation in judgements in some cases, speakers were in almost total agreement in other cases, for instance with regard to coordination in Swedish and with regard to some of the NPIs in English. We believe the differences between the QEs that we have seen in the judgements reflect real differences between the QEs but larger studies of these different dimensions of negativity should be able to tell us more about the nature of this issue.

## References

Barwise, J., Cooper, R. (1981), "Generalized Quantifiers and Natural Language", *Linguistics and Philosophy,* 4, p. 159-219.

Brandtler, J. (2012), *The Evaluability Hypothesis: The Syntax, Semantics and Pragmatics of Polarity Item Licensing*, John Benjamins, Amsterdam.

Chierchia, G. (2013), *Logic in Grammar: Polarity, Free Choice, and Intervention*, Oxford University Press, Oxford.

Clark, Herbert H. (1976), *Semantics and Comprehension*, Mouton, The Hague.

von Fintel, K. (1999), "NPI-licensing, Strawson-entailment, and Context-dependency", *Journal of Semantics*, 16, p. 97-148.

Gajewski, J. (2011), "Licensing Strong NPIs", *Natural Language Semantics*, 19, p. 109-148.

Giannakidou, A. (1998), *Polarity Sensitivity as (Non)veridical Dependency*, John Benjamins, Amsterdam.

Huddleston, R., Pullum, G. (2002), *The Cambridge Grammar of the English Language*, Cambridge University Press, Cambridge.

Israel, M. (2011), *The Grammar of Polarity*, Cambridge University Press, Cambridge.

Klima, E. S. (1964), "Negation in English", in Fodor, J. A., Katz, J. J. (eds), *The Structure of Language*, Prentice Hall, Englewood Cliffs, NJ, p. 246-323.

Ladusaw, W. (1980), "On the Notion 'Affective' in the Analysis of Negative-Polarity Items", *Journal of Linguistic Research*, 1/2.

Moxey, L. M., Sanford, A. J. (1987), "Quantifiers and Focus", *Journal of Semantics*, 5, p. 189-206.

Moxey, L. M., Sanford, A. J., Dawydiak, E. (2001), "Denials as Controllers of Negative Quantifier Focus", *Journal of Memory and Language*, 44, p. 427-442.

Rosqvist, B. (2004), *Negativ och positiv polaritet. Ett dyft om polaritetkänslighet i svenskan*, Master's thesis, Lund University.

Sailer, M. (2007), "Complement Anaphora and Negative Polarity Items", in Puig-Waldmüller, E. (ed.), *Proceedings of Sinn und Bedeutung 11*, Universitat Pompeu Fabra, Barcelona, p. 494-508.

Sanford, A. J., Dawydiak, E., Moxey, L. M. (2007), "A Unified Account of Quantifier Perspective Effects in Discourse", *Discourse Processes*, 44, p. 1-32.

Teleman, U., Hellberg, S., Andersson, E. (1999), *Svenska Akademiens Grammatik*, Norstedts Ordbok, Stockholm.

van der Wouden, T. (1997), *Negative Contexts. Collocation, Polarity and Multiple negation,* Routledge, London & New York.

Zwarts, F. (1998), "Three types of polarity", in Hamm, F., Hinrichs, E. (eds), *Plurality and Quantification,* Kluwer Academic Press, Dordrecht, p. 177-238.