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## The relation between quantification and negative polarity items: an ERP-study

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We report the results from an offline acceptability study and an online EEG study on Negative Polarity Items (NPIs) in quantified contexts in Swedish. NPIs are elements (e.g. *any*, *ever*, *a bit*) that need to appear in the scope of a negative licenser to be well-formed (e.g. Ladusaw 1980). The overarching aim of the studies is to see to what degree different negative quantifiers can license polarity sensitive material. The quantifiers under investigation in the study differ with regard to whether they include an overt negative element (*inte*), a property that can have an effect of the perceived negativity (see Horn, 1989; Ross, 1973).

The acceptability study included both NPIs (*alls* ‘at all’, *ens* ‘even’, *förrän* ‘until’, *ett dugg* ‘one bit’) and elements sensitive to clause level polarity, namely tag questions and polarity sensitive co-ordination elements (*och . . . också* ‘and . . . also’, *och . . . heller* ‘and . . . neither’). The four negative quantifying expressions were *högst* ‘at most’, *inte mer än* ‘no more than’, *få* ‘few’ and *inte många* ‘not many’. *Högst* and *få* were selected because they are likely to show a less negative-like behaviour (for less negative-like behaviour of English *at most*, the counterpart of *högst*, see Sanford, Dawydiak and Moxey 2007, and for less negative-like behaviour of *få*, see Klingvall and Heinat 2022). *Inte mer än* (‘no more than’) and *inte många* (‘not many’) were included since they are semantically similar to the other two, but contain the overt negative element *inte* (‘not’). In addition to the conditions with negative quantifiers, a condition with main clause negation (MCN) and a condition with no negation at all (POS) were included. While the former should constitute the maximal degree of negativity and thus license all types of negation sensitive material, the latter should be completely ill-formed in the same contexts.

The material for the acceptability study consisted of 240 items, of six sentences each. Each sentence featured one of the six licensing conditions (MCN, POS, and the four quantifiers), and the sentences within the same item contained the same polarity sensitive material (30 items for each of the four NPIs; 60 items with coordination – 30 negative patterns, 30 positive patterns – and 60 items with tag questions – 30 negative, 30 positive). Each participant saw only one sentence from each item and saw an equal number of all types of manipulation. The 32 participants (native speakers of Swedish), thus rated 240 sentences on a 7-grade Likert scale.

The negative quantifiers fell in between POS and MCN in the acceptability study. More precisely, all quantifiers differed significantly from POS both with regard to NPI licensing and clause level polarity. Within the group of quantifiers, *högst* (‘at most’) was the least negative one, and *inte många* (‘not many’) was the most negative one, even patterning with MCN, in some cases. The quantifiers *få* (‘few’) and *inte mer än* (‘no more than’) were rated in between the other two.

The EEG study investigated the processing of the same NPIs as in the acceptability study in the context of the four negative quantifiers, again comparing them to cases with main clause negation and no negation at all. 420 items were constructed (105 for each NPI). The sentences, which were distributed across 4 lists, were read by 42 participants (right-handed native speakers of Swedish with no diagnosed neurological disorders). One fourth of the sentences were followed by a content yes/no question. Previous studies on NPIs have found N400 and/or P600 and/or LLAN effects for unlicensed NPIs relative to licensed ones (e.g. Liu, König & Mueller, 2019; Steinhauer, Drury, Portner, Walenski & Ullman, 2010; Xiang, Dillon & Phillips, 2009; Xiang, Grove & Giannakidou, 2016; Yurchenko et al., 2013). Based on the acceptability study, we expected POS to show effects relative to MCN, and possibly also smaller effects for the conditions with quantifiers relative to MCN, since they appeared to be weaker NPI licensers in the behavioural study. For N400 and P600, the region of interest consisted of CP3, CPz, CP4, P3, Pz,

P4, O1, Oz and O2, and the relevant times were 300-500 ms after the onset of the NPI, for N400, and 600-900 ms, for P600. For LLAN, the electrodes included were F3, F7, FC3 and FT7, and the relevant time was 900-1100 ms after onset of the NPI.

The results indeed showed effects for POS, relative to MCN in the N400, P600 and LLAN time windows. The quantifiers, on the other hand, did not differ significantly from MCN in any of these time windows. Even the quantifier *högst* ('at most'), which was the least negative one in the acceptability study, was negative enough not to give rise to any disruptive effects in processing as a licenser of NPIs. This is in line with the findings in Xiang et al. (2016), where different types of negative licensors did not result in differences in processing of the NPI in the N400 window. The distinctions found between the different quantifiers in the behavioural study were thus not present to a significant degree when the processing of these expressions was examined. In this talk we will discuss the implications of our main findings: Firstly, that even licensors with lower degrees of negativity in acceptability are negative enough for successful licensing of polarity sensitive material in processing. And secondly, that while negativity is scalar in acceptability, in processing it appears to be categorical.

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