Nobody doesn't like negative concord

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Background Logically, one might expect each negative element in a sentence to contribute an independent semantic negation. For example, in Dutch, the negative marker "niet" and the negative indefinite "niemand" together give rise to a *double negation* interpretation, resulting in a positive meaning, as showin in (1). However, in many languages (e.g., Serbian in (2)), a clause-internal combination of two negative elements (e.g., "ne" and "niko") in fact yields a *negative concord* interpretation, i.e., only one semantic negation.

(1) Niemand rent niet.
N-body run neg.
"Nobody doesn't run"
→ "Everybody runs"

(2) Niko ne trči
N-word neg run
"Nobody runs"

The contrast in (1-2) shows that languages vary with respect to the interpretation of negative elements. Here, we explore an influential hypothesis about what governs this variation: namely, that whether a language exhibits double negation (DN) or negative concord (NC) is partly determined by the phonological and syntactic nature of its negative marker. This hypothesis has its roots in typology; Jespersen (1917) first observed that languages with a phonologically weak negative marker (affix or particle) always exhibit negative concord, whereas languages with a (stronger) negative adverb always exhibit double negation. This was later weakened by Zeijlstra (2004), who noted that in fact some languages with negative adverbs have negative concord. We aim to bring new behavioural evidence to bear on this hypothesis by investigating whether learners are sensitive to the correlation between type of interpretation (DN or NC) and type of negative marker (affix or adverb). Specifically, we use an artificial language learning paradigm (Culbertson, 2019) to test whether English speaking participants find it easier to learn a double negation language (DN) in which the negative marker is an adverb compared to an affix, but find it easier to learn a negative concord (NC) language when the negative marker is an affix compared to an adverb.

Experiment Participants were taught a miniature language consisting of three verbs, four nouns, one negative marker, two negative indefinites (e.g., "niemand" in Dutch) and two universal quantifiers (e.g., "everybody" in English). We manipulated two between-subjects factors: Marker and Language. The Marker determined whether sentential negation was expressed by an affix or by an adverb. Both negative markers appeared post-verbally but the affix was phonologically/orthographically weaker (i.e., shorter) than the adverb and appeared orthographically attached to the verb (e.g., "V-im" vs. "V imek"). Language determined whether sentences involving both sentential negation and a negative indefinite were assigned a double negation or a negative concord meaning. For example, a critical sentence of the form [n-body V NEG] (e.g., "Midho jeck imek") could be used to describe a situation where everybody runs (positive, double negation meaning) or where no one does (negative, negative concord meaning), as indicated in Table 1.

Figure 1: Comprehension task in Adverbial condition

Participants were exposed to sentences in the language and then tested on their ability to (a) perform a sentence-picture-matching task, and (b) produce sentences describing image. See illustration in Fig. 1.

The experiment included training and testing on simple sentences with or without negation, on quantifiers in isolation (as answers to questions such as "Who is running?") and on sentences involving quantifiers (negative indefinites and universal quantifiers). Critical sentences were quantificational sentences of the form [n-word V NEG], which involve a negative marker and a negative indefinite in subject position.

Comparison of accuracy levels for this sentence type across conditions indicates whether particular combinations of Marker and Language are easier to learn. This experiment, including predictions, design, and analysis was preregistered here.

Language	Marker	Critical Sentence	Meaning
DN	Affix	n-word V-im	$\neg\exists\neg \rightarrow \forall$ (positive)
	Adverb	n-word V imek	$\neg\exists\neg \rightarrow \forall$ (positive)
NC	Affix	n-word V-im	$\neg\exists$ (negative)
	Adverb	n-word V imek	$\neg\exists$ (negative)

Table 1: Critical sentence type across conditions

Results 124 English speakers were recruited on Mechanical Turk and randomly assigned to one of four Marker-Language conditions (ADV-DN: 29; ADV-NC: 33, AFF-DN: 32, AFF-NC: 30). Fig. 2 shows the proportion of correct responses for critical sentences (N-word V NEG) per condition. Fig 2a shows accuracy rates in comprehension, i.e., selection of the correct image; Fig 2b shows accuracy rates in production, here determined by correct inclusion of the negative marker in the response. A logit mixed-effects model predicting accuracy by Marker, Language and its interaction was fitted separately for comprehension and production data. These models revealed that (a) accuracy rates in NC languages are significantly higher than in DN languages both in comprehension (χ^2 =24, p <.001) and in production (χ^2 =4.5, p =.03); and (b) there is no significant Language×Marker interaction in either comprehension (χ^2 <1, p =.9) or production (χ^2 =3, p =.1).

Discussion Our findings fail to provide evidence that the connection between the type of negative marker and the type of language, as attested in the typology, correlates with a learning preference. Rather, participants in our experiment find it more difficult to learn double negation languages independently of whether the negative marker is an adverb or an affix. This is particularly surprising in the context of English, often described as a (mostly) double negation language. The fact that *interpreting* a sentence with two negative elements is harder when each negative element contributes an independent semantic negation might be tied to the cost of interpreting negation (see review in Tian and Breheny, 2016): processing negation twice might simply be hard, prompting learners to assign negative meaning as soon as they process one negative element. The disadvantage of double negation in *production* is less clear in our data, but may similarly indicate difficulty with using multiple negative elements to express a positive meaning; indeed our results suggest that when two negative elements are present they are more easily treated as concord. Further work will aim at exploring possible explanations of this dispreference for double negation languages.

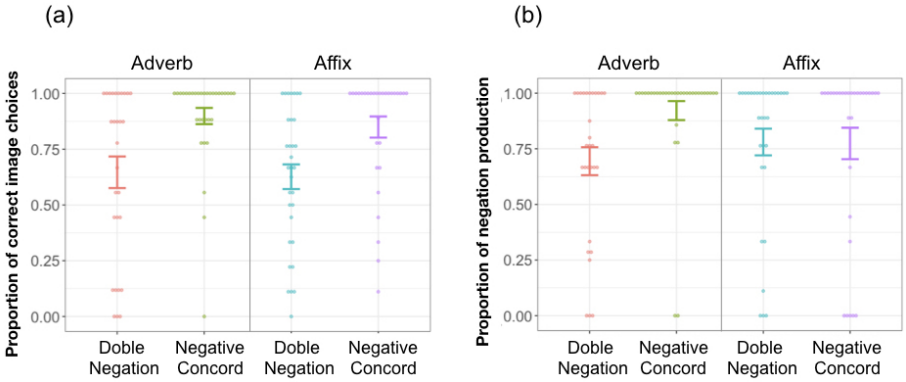

Figure 2: Accuracy rates for [N-word V NEG] sentences in (a) comprehension and (b) production

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