

The Role of Prosody in the Interpretation of Negated Conjunction and Disjunction in English and Hungarian

Introduction: Sentences containing negated conjunction (not A and B) and negated disjunction (not A or B) can be interpreted either as joint denial (NOR) or alternative denial (NAND). Prior descriptive and theoretical research has argued for two types of cross-linguistic variation (Szabolcsi 2002; Szabolcsi & Haddican 2003; Nicolae 2017). First, Szabolcsi (2002) observed that in English-type languages (e.g., Dutch & German), negated disjunction is more likely to be interpreted as joint denial ($\neg[A\vee B]$), whereas in Hungarian-type languages (e.g., French, Italian, & Japanese), it tends to be interpreted as alternative denial ($\neg A\vee\neg B$). She explained this pattern in terms of scope, and argued that Hungarian disjunction *vagy* is a Positive Polarity Item (PPI). Second, she claimed that negated conjunction is more likely interpreted as joint denial ($\neg A\wedge\neg B$) in Hungarian, but as alternative denial ($\neg[A\wedge B]$) in English. Szabolcsi & Haddican (2003) further noted that prosodic stress on the conjunction word *and* results in an alternative denial (NAND) interpretation in English, but not in Hungarian, which lacks this type of focus marking.

Experimental research, however, has yielded mixed results. While Pagliarini et al. (2021) found support for the PPI status of disjunction in Hungarian, French, and Italian using a Truth Value Judgment Task (TVJT), Lungu et al. (2021) used naturalness judgments on continuations in French, Italian, English, or Romanian, and did not find evidence for cross-linguistic variation, nor for the distinction between PPI- and non-PPI-disjunction languages. Other TVJT studies on Dutch (Van Haut et al. 2024) and French (Larralde et al. 2021) have highlighted the role of prosody, reporting that stress on negation creates a bias toward the joint denial (NOR) interpretation. Surányi & Gulás (2022) tested Hungarian-speaking adults on negated disjunction and found a disambiguating effect of prosody: stress on negation led to joint denial (NOR), while stress on the first disjunct followed by a prosodic break favored alternative denial (NAND). However, there has been no experimental study examining the effect of prosody on the interpretation of both negated conjunction and disjunction in English and Hungarian. The present study addresses this gap using a novel multiple-answer picture selection task.

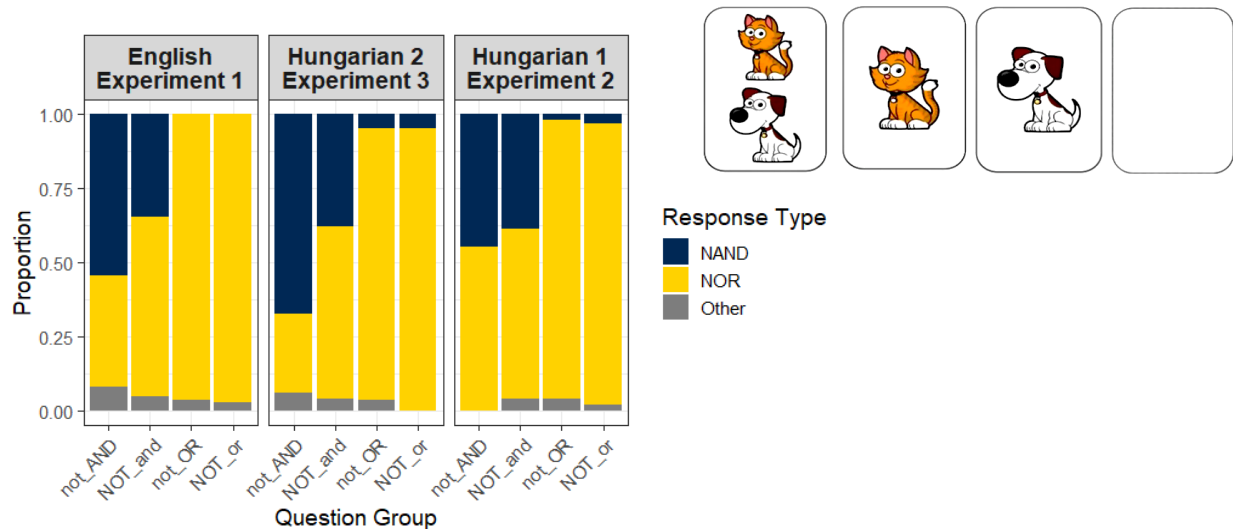
Methods: Three experiments (N=50 each) tested the role of prosody in the interpretation of negative conjunction and negative disjunction in English and Hungarian using a multiple-answer picture selection task. In Experiment 1, English-speaking participants heard sentences that either stressed negation (NOT) or the connective words (AND/OR). Experiment 2 tested Hungarian speakers and presented similar Hungarian stimuli that either stressed negation (NINC) or the connective words (ÉS/VAGY) (see Table 1). In Experiment 3, we used the same Hungarian sentences but placed the stress on the first conjunct/disjunct followed by a prosodic break, similar to Surányi & Gulás (2022). In all trials of the three experiments, participants were presented with four cards: one with two animals, two with one animal, and one empty (Figure 1). They were asked to select as many cards as satisfied the description (Table 1).

Results: Negative disjunction was interpreted as joint denial (Figure 1, yellow bars) in both English (Experiment 1) and Hungarian (Experiment 2 & 3). Across all experiments in both languages, there was no effect of prosody on negated disjunctions, whether stressing the disjunction word, or stressing the first disjunct followed by a prosodic break. In both languages, negated conjunctions were ambiguous between joint denial (NOR, Figure 1, yellow bars) and alternative denial (NAND, Figure 1, blue bars). Stressing the conjunction word increased the likelihood for alternative denial (NAND) interpretations in both languages in Experiments 1 & 3 (95% CI for mixed effects regression slopes were [-9.46, -3.27] and [-7.31, -2.84] respectively). We did not find any effect of prosodic break on the interpretation of negative conjunction.

Conclusion: In line with Lungu et al. (2021), we found no experimental evidence for crosslinguistic semantic variation in the interpretation of negative disjunction or conjunction. Negative disjunction was interpreted as joint denial (NOR) and negative conjunction was ambiguous between the two interpretations in both English and Hungarian. The experiments did not find prosodic focus to disambiguate the joint vs. alternative denial interpretations of negative disjunction. However, we found robust evidence for Szabolcsi & Haddican’s (2003) claim that focus stress on the conjunction word *and* in English can disambiguate a negative conjunction and increase the likelihood of an alternative denial (NAND) interpretation. However, unlike the original claim, the effect seems to be available in Hungarian, as well as English.

| Table 1 | English Example (Exp 1) | Hungarian Example (Exp 2) |
|---------|---|------------------------------------|
| not_AND | The card does not have a cat AND a dog. | A kártyán nincs macska ÉS kutya. |
| NOT_and | The card does NOT have a cat and a dog. | A kártyán NINCS macska és kutya. |
| not_OR | The card does not have a cat OR a dog. | A kártyán nincs macska VAGY kutya. |
| NOT_or | The card does NOT have a cat or a dog. | A kártyán NINCS macska vagy kutya. |

Figure 1: Left: Results for Experiments 1-3. Yellow bars represent join denial (NOR) responses and blue bars alternative denial (NAND) responses. Other answers are shown in grey. Right: Example cards presented to participants.



References: Larralde, C., Konradt, A., & Szendrői, K. E. (2021). Information Structure and Scope Interactions: Disjunction Wide Scope Induced by Focus. *Frontiers in Communication*. — Lungu, O., Fălăuș, A., & Panzeri, F. (2021). “Disjunction in Negative Contexts: A Cross-Linguistic Experimental Study”. *Journal of Semantics*. — Surányi, B., & Gulás, M. (2022). “A diszjunkció mint Pozitív Polaritású Elem: A prosódia hatása a magyar diszjunktív tagadó mondatok értelmezésére. Jelentés És Nyelvhasználat”. — Szabolcsi, Anna (2002). “Hungarian disjunctions and positive polarity”. In Istvan Kenesei & Peter Siptar (eds.), *Approaches to Hungarian*. Univ. of Szeged. — Van Haut et al. (2024) “Prosodic Disambiguation and the Scope Ambiguity of Sentences with Negation and Disjunction in Dutch”. *TABU*. — Nicolae, Andrea C. (2017) Deriving the positive polarity behavior of plain disjunction. *Semantics & Pragmatics*. — Pagliarini, E., Lungu, O., van Hout, A., Pintér, L., Surányi, B., Crain, S., & Guasti, M. T. (2022).