# Classifying native versus foreign speech perception from EEG using linguistic speech features

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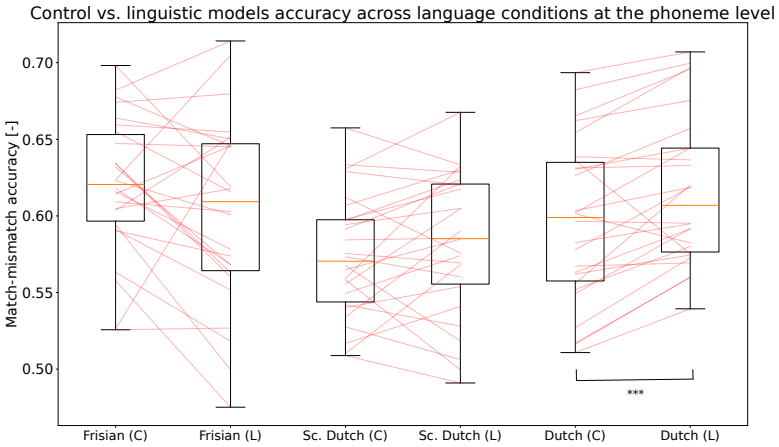
## Appendix A. Evaluation of the trained MICNN across languages without fine-tuning

Figure A1a depicts the MM accuracy obtained for each subject using control (C) and linguistic (L) models across language conditions at the phoneme level. At the group level, no significant differences were found between C and L conditions for both Frisian and scrambled Dutch. As expected from previous findings, we found a significant difference between C and L conditions for Dutch (Wilcoxon signed-rank test, $W = 41, p < 0.001$). We also depict the difference between L and C models' accuracy across language conditions in Figure A1b.

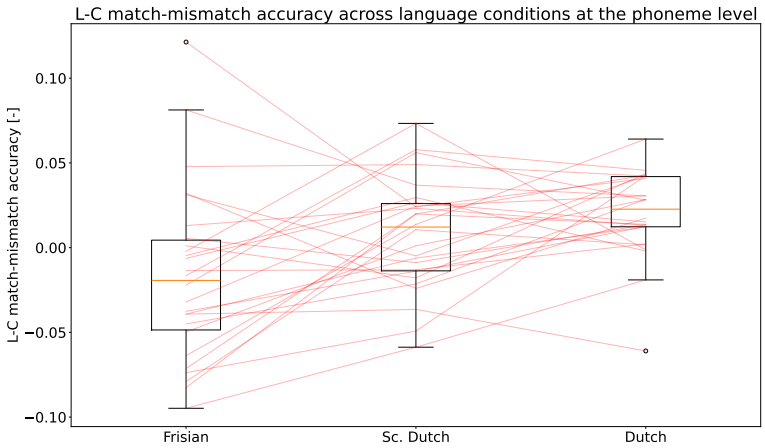
Figure A2a depicts the MM accuracy obtained for each subject using control (C) and linguistic (L) models across language conditions at the word level. At the group level, no significant differences were found between C and L conditions for both Dutch and scrambled Dutch (Wilcoxon signed-rank test, $W = 104, p = 0.071$ and $W = 119, p = 0.165$ respectively). Unexpectedly, we found a significant decrease of L compared to C conditions for Frisian (Wilcoxon signed-rank test, $W = 34, p = 1.09 * 10^{-4}$). We also depict the difference between L and C models' accuracy across language conditions in Figure A2b.

Please note that the model was trained on Dutch stimuli, which might have introduced a bias to better model the linguistics benefit over the lexical segmentation features in Dutch and not in Frisian. In addition, evaluating models on different amounts of data (the three stimuli are of different duration) might be unfair for comparison. In the next step, we, therefore, fine-tune the model for each language and evaluate it on the maximum length of the shortest stimuli (i.e., 14.1 min).

## Appendix B. Neural tracking of linguistic over control models across languages

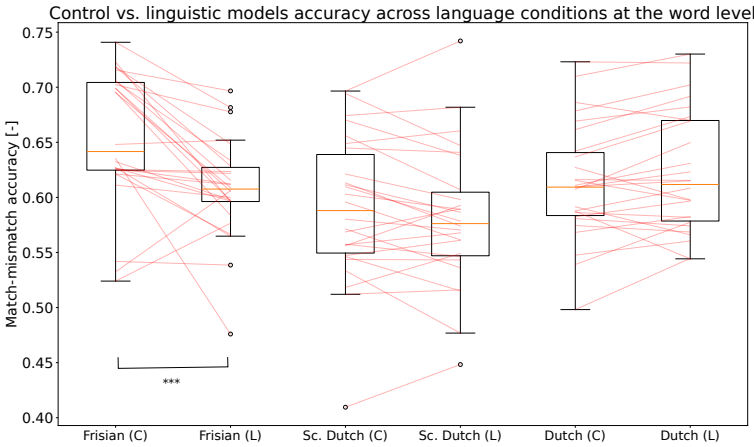



(a) Control vs. linguistic models

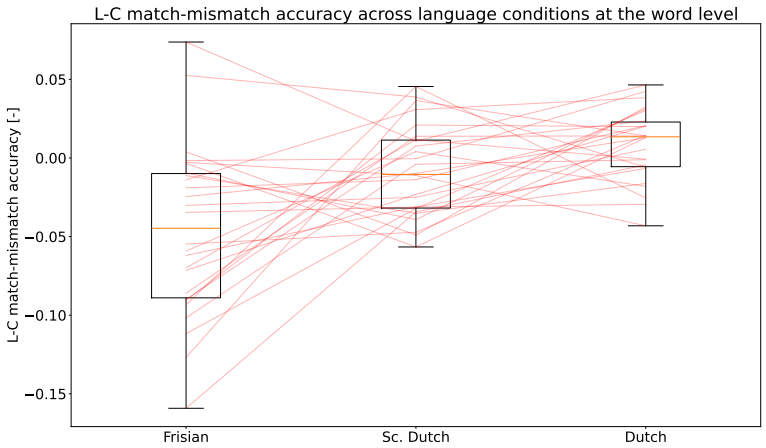



(b) Difference between control and linguistic models

Figure A1: **Control (C) vs. linguistic (L) models' accuracy across language conditions at the phoneme level.** The boxplots represent the accuracy obtained per subject, and the red lines connect subjects between (a) the performance of the C and L model for a given participant; (b) the performance's difference on a language condition and another. The language conditions are Frisian, scrambled Dutch (Sc. Dutch), and Dutch. *Wilcoxon signed-rank test:* $(***: p < 0.001)$

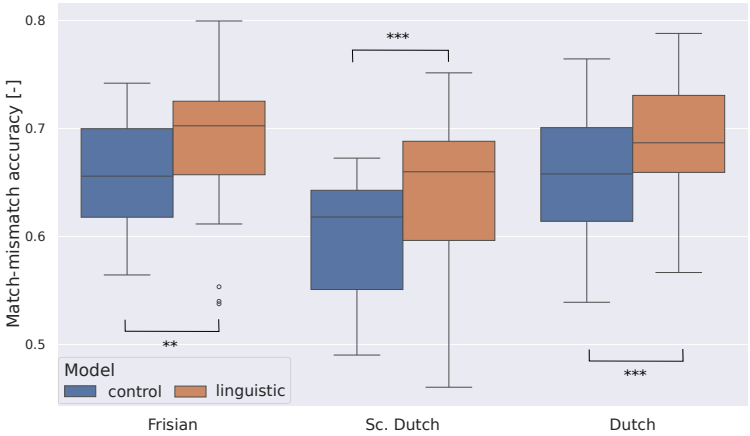



(a) Control vs. linguistic models

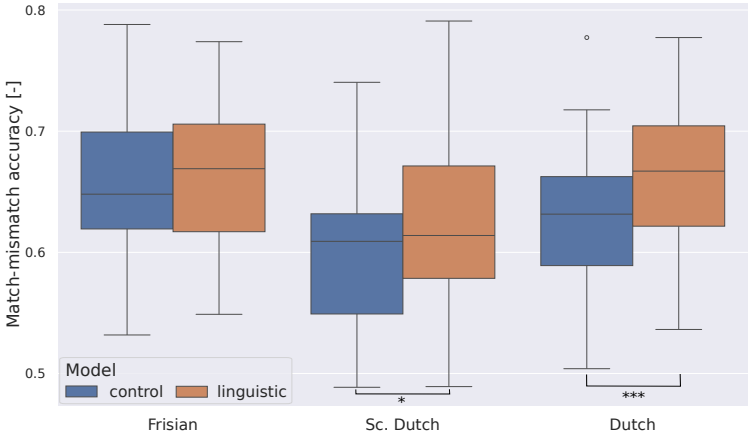



(b) Difference between control and linguistic models

Figure A2: **Control (C) vs. linguistic (L) models' accuracy across language conditions at the word level.** The boxplots represent the accuracy obtained per subject, and the red lines the slope between language conditions for a given subject. (a) The performance of the C and L models across language conditions; (b) L-C performance. The language conditions are Frisian, scrambled Dutch (Sc. Dutch), and Dutch. *Wilcoxon signed-rank test:*($***: p < 0.001$)




(a) Control vs. linguistic models (phoneme level)




(b) Control vs. linguistic models (word level)

Figure B1: **Control (C) vs. linguistic (L) models' accuracy across language conditions at the phoneme and word level in the language fine-tuning condition.** The boxplots represent the accuracy obtained per subject at (a) the phoneme level (b) the word level. The language conditions are Frisian, scrambled Dutch (Sc. Dutch), and Dutch. *Wilcoxon signed-rank test:* $(* : p < 0.05, ** : p < 0.01, * * * : p < 0.001)$