Three-site attachment experiment series: Perceived attachment

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After completing the production experiment, we did a small perceived attachment test. This was mainly to verify that the subjects were indeed able to conceive pronounciation patterns that would enable a listener to get the right understanding of the sentences or fragments.

Each possible attachment of each test item had been uttered by *two* different subjects in each of the two production experiments (with and without relative clause). Now, each of the recordings was listened to by *two* of us (only the native speakers of us did this work).

This has the disadvantage that we as perceivers are biased by knowing what the experiment is about. For example we know that there is always exactly one NP most important. But as we did not memorize the way the three possible cases were assigned to the speakers and there were no other clues about this either, the experiment setup was still realistic enough. Again, the goal of this experiment was only to verify that the subjects *did* manage to convey the NP selection only using their voice.

The results were logged using questionnaires of roughly the same design as the ones used for the pretest: For each item, we selected for each of the three cases how much we believed that this case was the intended one. The scales had a 1 to 5 range each. Normally, we would select 5 for the perceived attachment/stress and 3 for the others, but the scale system *allowed* to describe less clear cases as well.

As with the pretest, each set of results (one of us listening to one speaker) was *normalized* to a mean of 0 and a standard deviation of 1 before doing further processing on it. The rationale for this is the same as for the normalization in the pretest. In our case, the results were mostly uniform, so the normalization shifted the mean by 3.6 and scaled the results by about 1.1 in most cases.

From the 192 data points (4×48) for each intended attachment/stress for each of the two experiments, we computed the *mean* and *standard deviation* of how much we believed in each of the three possible intensions. The results are as follows (mean, with standard deviation in parentheses):

	Production task without relative clauses		
Intended:	Perceived:		
	NP1	NP2	NP3
NP1	1.420 (0.287)	−0.673 (0.233)	−0.701 (0.010)
NP2	−0.702 (0.009)	1.445 (0.101)	−0.702 (0.009)
NP3	−0.665 (0.269)	−0.603 (0.436)	1.170 (0.628)

	Production task with relative clauses		
Intended:	Perceived:		
	NP1	NP2	NP3
NP1	1.239 (0.694)	−0.677 (0.174)	−0.505 (0.603)
NP2	−0.186 (0.913)	0.473 (1.008)	−0.373 (0.742)
NP3	−0.462 (0.661)	−0.435 (0.675)	0.926 (0.963)

At first glance, the data in the tables still gives the impression that perception of the intended stress/attachment was not easy but possible: It seems that for the experiment *without relative clauses*, perception of the intension *NP3 stressed* leads to most uncertainity. For the experiment *with relative clauses*, we get an impressive amount of uncertainity while trying to perceive the intended attachment for the *NP2 attachment*, while the other cases seem to pose only medium difficulty for the listener.

The *F-values*[1] calculated for each line of the tables predict far more problems: For the experiment without relative clauses, the F-values per intension are $NP1 = 0.653$, $NP2 = 146.024$, $NP3 = 1.628$, and for the experiment with relative clauses *NP1=1.263, NP2=0.081, NP3=0.341*.

This can be interpreted to say that if there was a relative clause at all of if the speaker tried to stress the *third* NP in a list of *NP1 prep NP2 prep NP3*, the listener has only a minimal chance to do significantly better than *guessing* to perceive the intended stress/attachment correctly!

Nevertheless, we went on and analyzed the speech recordings for *pitch, volume and duration (lengthening and pauses)* patterns. This would tell us about the means used by the speakers while *trying* to convey the intended stress/attachment, even though their success was quite limited for certain cases as we have seen.

[1] Let M be the mean of the means of a line, then we have $MSB = \sum_i (mean_i - M)^2$ and $MSW = \sum_i (192 \times stddev_i^2)$ and $F = \frac{189 \times MSB}{2 \times MSW}$