Processing expressive vs. descriptive meaning: Neurolinguistic evidence for early differences in lexical access, as well as robust and long-lasting differences in integration

Introduction. Modal particles (MPs) are expressive elements that are ambiguous between an MP reading and a counterpart (CP) reading. While the CP contributes descriptive meaning to the sentence and affects truth conditions, the MP contributes an expressive meaning by conveying speaker attitudes or linking the sentence to the discourse. German minimal pairs with MP and CP readings, such as in (1) for *ruhig* (lit: *quietly*), enable us to directly compare the processing of expressive meanings (1a) with that of descriptive meanings (1b, where *ruhig* is a manner adverb).

(1) (a) Du kannst die Tropfen **ruhig** ins Auge machen. '[It's alright], you can apply the eye drops.'

(b) Du musst die Tropfen **ruhig** ins Auge machen. 'You have to apply the eye drops calmly.'

Behavioral studies of sentence pairs like (1) show that MPs lead to longer reading times than their descriptive CPs, indicating that the expressive meaning of these minimal pair sentences is related to higher processing costs than their descriptive meaning (Dörre 2018, Dörre et al. 2018).

We present the results of a neurolinguistic investigation of the processing of MP-CP minimal pairs like (1), with the goals of characterizing the correlates and timecourse of expressive meaning processing, and of adding qualitative assessments to the quantitative differences revealed by behavioral studies. Here, we focus on the two lexemes *ruhig* (counterpart: manner adverb) and *schon* (counterpart: temporal adverb, lit. `already'). Both lexemes have meaning frequencies balanced between the MP and CP reading, but differ in their overall frequencies (*schon* is more frequent than *ruhig*) and their expressive meaning contributions: While *ruhig* adds a sense of encouragement to the descriptive meaning of the sentence, *schon* signals that the descriptive content is only partially compatible with the situational context, as illustrated in (2) .

(2) (a) Du kannst deinen Badeanzug **schon** einpacken. '[Well,] you *can* pack your bathing suit. [But you are not going to use it, it is way too cold for swimming]' OR '[I know you are hesitant, but] you *can* pack your bathing suit. [It's going to be quite warm in the afternoon!]'

(b) Du kannst deinen Badeanzug **schon** einpacken. 'You can already pack your bathing suit. [We are about to go to the beach.]'

Materials and methods: For each of the two lexemes, we constructed 30 items in two conditions. Items consisted of minimal sentence pairs like (1) and (2), disambiguated between MP and CP readings by a preceding context (interspersed with fillers). Processing was monitored in an EEG study with n=44 German native speakers. Due to the differences in frequencies and expressive meaning contributions, quantitative data analysis for both lexemes was run separately. We assessed differences between MP and CP conditions on the target lexemes plus the following two words, analysing (a) ERP amplitudes in visually identified time windows, hierarchical resolution of condition*topography, and (b) time-frequency effects in time windows identified by cluster-based permutation tests. All reported results are statistically significant.

Results: RUHIG: The ERP analysis revealed (1) enhanced P200-P600 amplitudes on RUHIG for MP relative to CP readings; (2) enhanced P600 amplitudes on RUHIG+1 and RUHIG+2 for MP relative to CP readings. The time-frequency analysis revealed power enhancement in the lower gamma band for CP relative to MP readings from 280–380 ms post target onset. (see Fig.1 (A) for an illustration of ERP results, and Czypionka et al. 2025 for details).

SCHON: The ERP analysis revealed (1) an increased N400 amplitude on SCHON for MP relative to CP readings, and (2) an increased P600 amplitude on SCHON+2 for MP relative to CP readings. The time-frequency analysis revealed no difference between both readings for this lexeme. (See Fig.1 (B) for an illustration of ERP results).

Discussion. Taken together, our findings show that the contrast between expressive and descriptive meaning contributions of words that can function as MPs in German has immediate and long-lasting effects on sentence processing, becoming visible already on the target lexeme and extending at least two words into the spillover region. While the expressive meaning contributions of both MPs is associated with an increase in P600 amplitude in the spillover region, processing correlates on the MP itself differ between individual MPs, as showcased by the two particles *ruhig* and *schon*. For *ruhig*, we find an increase in P200-P600 amplitude on MP-*ruhig*, which we interpret as reflecting immediate access to the expressive dimension. The increase in gamma power for CP-*ruhig* in turn reflects lexical access cost (which only occurs for descriptive meaning). In contrast, MP-*schon* was associated with N400, rather than P600 increases on the target lexeme, and no time-frequency differences to CP readings. We take these discrepancies to reflect the fact that the expressive meaning contribution of *schon* is in a certain way more complex than that of *ruhig*, plus there are more available alternative readings for *schon* than for *ruhig* (besides being a temporal adverb, *schon* can also be a focus particle). In contrast, the parallel effects of both lexemes in the spillover region reflect the overall increase in processing cost associated with integrating expressive meaning.

Our findings are in line with reports of enhanced P600 amplitudes for semantically and pragmatically complex readings (see, a.o., Regel et al. 2014; Weissman and Tanner 2018; Regel et al. 2011; Spotorno et al. 2013 for irony, Ji 2021 for politeness violations, or Coulson and van Petten 2002; De Grauwe et al. 2010 for metaphors), and open various future ways of research to check the claims of different models on the quality and timecourse of processing of complex semantic and pragmatic information.

References

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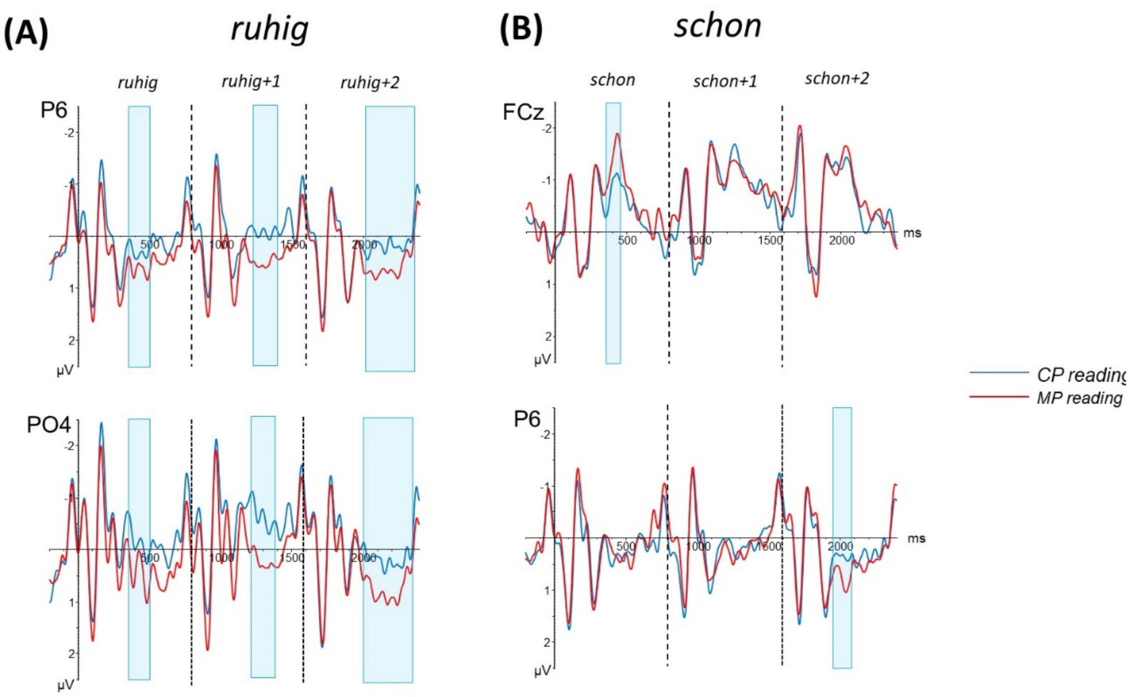

Figure 1: ERP curves for CP and MP readings for both lexemes on the target lexeme plus the two following words at selected electrode sites. Results for ruhig are depicted on the left side (Panel (A), results for schon are depicted on the right side (Panel (B)). Curves for CP readings are blue, curves for MP readings are red. Dashed lines indicate the separation between time windows for the target lexeme and the two following words, with word positions written above the respective time windows. The analysed time windows are marked in light blue. Note that Panel B illustrates the early N400 in the upper graph, and the late P600 in the lower graph.