Supplementary materials for: *Examining the influence of perspective and prosody on expected emotional responses to irony: Evidence from event-related brain potentials*

Participants

Sample size was based on previous ERP studies concerned with the processing of irony plus prosody (Regel, 2009; N = 20) and emotional information during silent reading (e.g., Delaney-Busch & Kuperberg, 2013, N = 24; Kunkel et al., submitted; N = 28) and a power analysis with the program G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) regarding the two-way between-within interaction effects. This analysis revealed for an effect size of $f = .15$ (small to intermediate effect) that 74 participants were needed to achieve a statistical power of $(1-\beta) = .80$ with the significance level set to $\alpha = .05$.

Stimuli

The first sentence was identical across conditions, and described a background event in which one person (the target) has done something worthy of criticism. In the second sentence, another person (the speaker) delivers criticism to the target in one of three ways: literal criticism with natural prosody; ironic criticism with ironic prosody; or ironic criticism with natural prosody. This represented our first factor: *attitude*. The speaker's comment started on average about 3,100 ms before the offset of the second sentence, with the disambiguating word being the penultimate word (e.g., Steve muttered, "You're such a cheerful guy.") or the final word (e.g., Lauren said to him, "You're so energetic."). The last two words lasted approximately 1,000 ms. The final sentence described either the target's perspective (how they react to the criticism) or the speaker's perspective (the reaction they intend to elicit). Regardless of perspective, the response was always one of *amusement* (Experiment 1) or *hurtfulness* (Experiment 2). This gave a 2 perspective (target vs. speaker) × 3 attitude (literal-natural vs. ironic-natural vs. ironic-ironic) within-subjects design, with emotional response (amused vs hurt) as a between-subjects factor.

The 240 items were assigned to six counterbalanced lists, with all items appearing exactly once per list and in a different condition in each of the six lists. This ensured conditions were encountered with equal frequency in each list, with participants seeing 40 items per condition. A set of 240 filler materials were interspersed with the experimental materials, giving a total of 480 items per list. Fillers took the same format as experimental materials (three sentences, including a comment and a subsequent speaker intention or a listener reaction), but included an assortment of events, comment types, and subsequent responses from the speaker or target.

Electrophysiological measures

EEG activity was recorded continuously from midline electrodes: Fpz, AFz, Fz, FCz, Cz, CPz, Pz, POz, Oz, and Iz; from left hemisphere electrodes: IO1, Fp1, AF3, AF7, F1, F3, F5, F7, F9, FC1, FC3, FC5, FT7, C1, C3, C5, M1, T7, CP1, CP3, CP5, TP7, P1, P3, P5, P7, PO3, PO7, O1, two nonstandard positions PO9’ located at 33% and O9’, located at 66% of the M1-Iz distance, and from the homologous electrode sites over the right hemisphere.

After EEG channels were recalculated to an average reference and high-pass filtered (0.1 Hz, 6 dB/oct), (ocular) artifacts were removed and EEG data were corrected (cf. Dudschig et al. 2016). To this end, a procedure similar to that described by Nolan, Whelan, and Reilly (2010) was used. This procedure used a predefined z-score threshold of ±3 to identify outliers relating to channels, epochs, independent components, and single-channels in single-epochs and included the following successive steps. In the first step, epochs containing extreme values in single electrodes (e.g., amplifier blockings, values larger ±1000 μV in any electrode) were removed, as were trials containing values exceeding ±75 μV in multiple adjacent electrodes that were not related to eye movements. Secondly, z-scored variance measures were calculated for all electrodes, and noisy EEG electrodes (z-score > ±3) were removed if their activity was uncorrelated to EOG activity. Thirdly, this ‘cleaned’ EEG data set was subjected to a spatial independent component analysis (ICA) based on the infomax algorithm (Bell & Sejnowski, 1995). ICA components representing ocular activity (blinks and horizontal eye movements) were automatically identified using z-scored measures of the absolute correlation between the ICA component and the recorded hEOG and vEOG activity, respectively, and confirmed by visual inspection before being removed from the EEG data set. Fourthly, previously removed noisy channels were interpolated in the ICA-cleaned EEG data set using the average EEG activity of adjacent uncontaminated channels within a specified distance (4 cm, ~ 3-4 neighbors per electrode) in order to ensure a full electrode array for each participant. Finally, single trial EEG waveforms for each electrode were visually inspected, and trials still containing artifacts were removed.

ERP analysis

To capture ERP effects triggered by the criticism of the second sentence, for which the disambiguating word started approximately 1000-500 ms before its offset, the analysis epoch started 1,400 ms prior to the offset of this sentence and lasted until 500 ms after it, with a total epoch duration of 1,900 ms. For the third sentence, the epoch time-locked to the critical emotion word started 200 ms prior to this word’s onset and lasted until 1,500 ms after it, resulting in total epoch durations of 1,700 ms. For artifact-free trials, the signal at each electrode site was averaged separately for each experimental condition, time-locked to the onset of the critical word. All resulting ERP waveforms were low-pass filtered (6 Hz, 6 dB/oct), and aligned to a 200-ms baseline either at the start of the analysis epoch of the second sentence (-1,400 to -1,200 ms) or prior to the onset of the critical emotion word of the final sentence (-200 to 0 ms).

Additional figures

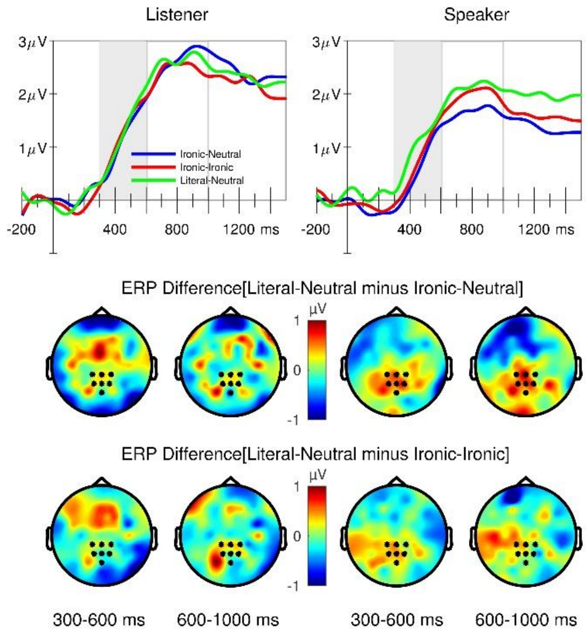

Figure 3 Average ERP waveforms for literal-natural, ironic-natural, and ironic-ironic criticism separately for Listener / Target perspective (left panel) and Speaker perspective (right panel), for Experiment 1 (amused responses). The respective topographic maps of ERP amplitudes in mean difference waveforms for the 300-600 ms and 600-1000 ms time intervals are depicted below.

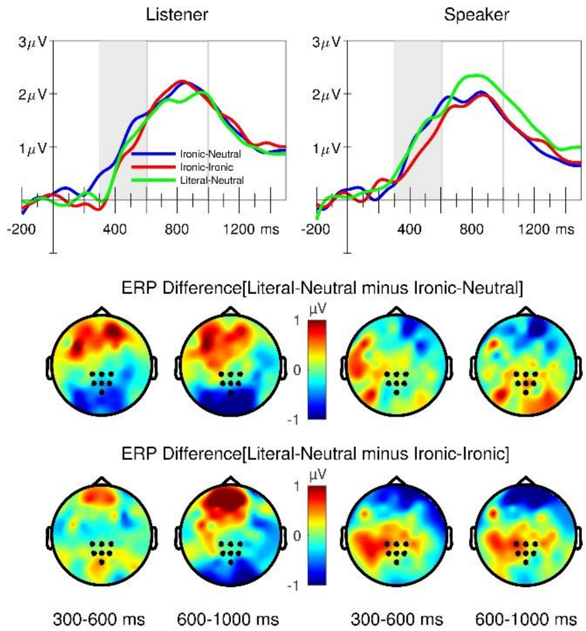

Figure 4 Average ERP waveforms for literal-natural, ironic-natural, and ironic-ironic criticism separately for Listener / Target perspective (left panel) and Speaker perspective (right panel), for Experiment 2 (hurt responses). The respective topographic maps of ERP amplitudes in mean difference waveforms for the 300-600 ms and 600-1000 ms time intervals are depicted below.