

Emotional or linguistic prosodic processing – who wins the race?

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Sentence prosody conveys important linguistic information about a speech act; for instance, it helps to differentiate between declarative and interrogative constructions (“linguistic prosody”). It also carries information about the inner state of a speaker (“emotional prosody”). These different types of information need to be encoded rapidly during sentence comprehension to ensure successful speech communication. Thus, the question arises if the processing of linguistic and emotional prosody is a dichotomous phenomenon, i.e., are the two functions of prosody independent or interdependent?

Systematic investigations of the comparative nature of these two functions are still rare but recent functional imaging evidence points to the fact that the two functions are subserved by shared and differentiating brain regions (e.g., Wildgruber et al., 2004). However, less is known about the temporal resolution of these two prosodic functions. The question at hand is whether the two prosodic functions run a similar time-course or not. As such temporal dynamics cannot be directly deduced from brain activation, event-related potentials (ERPs) can provide critical insight into this issue. Hence, we investigated the temporal dynamics of emotional and linguistic prosodic processing in an ERP experiment applying a well-established cross-splicing approach (e.g., Astésano et al., 2004; Kotz & Paulmann, 2007; Paulmann & Kotz, in press). Cross-splicing allows violating prosodic expectancy (emotional or linguistic) in a temporally and acoustically controlled manner. Previous studies applying this method have reported positive-going ERP components when prosodic expectancy was violated. However, the latency of these positivities differed as a function of linguistic and emotional prosody. While emotional prosodic expectancy violations elicit a positive ERP component approx. 350 ms after the splicing-point, linguistic prosodic expectancy violations elicit a positivity only 800 ms after the splicing-point. The question arises whether emotional prosodic processing may be prioritized due to the evolutionary significance of emotional stimuli (e.g., Vuilleumier, 2005). Alternatively, differences in previous results may result from experimental differences such as differences in stimuli, speaker type, and language of investigation.

Therefore, we investigated the processing of both linguistic and emotional prosodic expectancy violations in parallel. To this aim, a prosodically neutral head of a sentence was cross-spliced to a second half of a sentence that differed in emotional or linguistic prosody. Participants were asked to pay attention to emotional or linguistic prosody of the sentences. As predicted, a positive-going ERP response was elicited by linguistic and

emotional prosodic expectancy violations. However, the latency and the distribution of the two components differed. While responses to emotional prosodic expectancy violations were found 750 to 1100 ms after sentence onset at posterior electrode-sites, a positivity in the linguistic prosody condition had a later onset (1000 to 1350 ms) and a frontal distribution. These effects were found irrespective of task instruction. Given the differences in latency and distribution, we conclude, in line with previous neuroimaging evidence, that the processing of emotional and linguistic prosody relies at least partly on differing neural mechanisms.

References:

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