Researchers arguing for a non-arbitrary relation between language and emotion often assume that vowels evoke positive or negative feelings as a function of their sounds. In the literature on sound symbolism it is suggested that [i] (as in peace) is associated with positive words and [o] is associated with negative words (cf. Ohala, 2006). We resurrect this debate from the perspective of embodied emotion research by introducing an articulatory feedback hypothesis (see Zajone, Murphy, & Inglehart, 1989, for a related idea). This hypothesis postulates a direct link between face muscle contraction during speech production and self-perception of an individual’s emotional state. Our first study was based on an experimental paradigm introduced by Strack, Martin, and Stepper (1988). The authors instructed their participants to rate the funniness of cartoons while holding a pen between their teeth – which activates the zygomaticus major muscle (ZMM, the muscle responsible for smiling) – or while holding a pen between their lips – which blocks the ZMM. The cartoons were rated as funnier when the ZMM was contracted.

Interestingly, the ZMM is also contracted during the articulation of the vowel [i] and blocked during the articulation of the vowel [o] (Hardcastle, 1976). In order to test for a relation between vowel production and emotional state, we combined Strack et al.’s paradigm with an articulatory suppression paradigm. In Experiment 1, participants had to produce [i] or [o] once per second while rating the funniness of cartoons. In addition, we replicated the two pen conditions. As predicted, the cartoons were rated as funnier when the secondary task was to articulate [i] than when it was to articulate [o], \( F(1, 144)=6.43, p=.01; \eta^2=.085 \) (see Figure 1). Hearing [i] or [o] while looking at the cartoons did not influence the funniness ratings.

![Figure 1: Illustration of the four conditions (A = pen holding with the lips, B = pen holding with the teeth, C = articulating [o], and D = articulating [i]) and mean funniness ratings as a function of task (pen holding vs. articulation) and contracted muscle (ZMM vs. orbicularis oris muscle, OOM) in Experiment 1. Vertical bars represent standard errors.](image-url)
Experiment 2 aimed at demonstrating that the articulatory feedback mechanism has a direct impact on the emotional evaluation of words. In one condition, participants had to articulate and rate the pleasantness of “German” Consonant-Vowel-Consonant-Vowel-pseudowords. The vowels were either [i] and [e] (i&e-pseudowords; e.g., “gefi”) or [o] and [y] (o&y-pseudowords; e.g., “gofü”). In a control condition, participants listened to these pseudowords (i.e., the critical face muscles did not need to be contracted). We found a significant two-way interaction between vowel condition (i&e pseudowords vs. o&y-pseudowords) and mode (articulation vs. perception), $F(1,110)=5.81, p=.018$. I&e-pseudowords were rated as more pleasant than o&ü-pseudowords in the articulation condition, $F(1,110)=11.25, p=.001$, but no differences were observed in the control condition, $F<1$. The differential activation of the ZMM vs. OOM directly influenced emotional evaluation of the pseudowords (see Figure 2).

![Figure 2: Mean pleasantness ratings of pseudowords (Experiment 3) as a function of vowel type ([i] & [e] vs. [o] & [y]) and mode (production vs. perception)](image)

In Experiment 3, children from three primary schools in Erfurt sang aloud three verses of the German (phonological awareness) song “Drei Chinesen mit dem Kontrabass” [Three Chinese with a double bass] (http://www.youtube.com/watch?v=B9ylfF-sYf4), which is comparable to the English song “Apples and Bananas”. In each verse of this song, all vowels are replaced by a single vowel. In our experiment we used the two verses in which all the vowels are replaced by an [o] and the one in which all vowels were replaced by an [i]. Subsequent to singing, participants had to decide which of these two verses was funnier. Significantly more children decided the [i] version to be funnier than the [o] version.

In sum, these findings provide clear evidence for the idea that (at least parts of) what was traditionally attributed to sound symbolism can be better explained in terms of articulatory feedback.

Reference