EMOTIONALLY TONED ONLINE DISCUSSIONS EVOKE SUBJECTIVELY EXPERIENCED EMOTIONAL RESPONSES

ELECTRONIC SUPPLEMENTARY MATERIAL 2

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Experiments 2-3 included additional measurements, which produced somewhat inconclusive results. Reporting these measurements in detail in the main article would compromise the legibility of the article. However, reporting all dependent variables and their results is vital for the sake of transparency, and for mitigating the file drawer problem. The additional measurements are reported in this supplementary file.

Experiment 2

In experiment 2, we measured physiological reactions to the discussion threads in addition to subjective emotional responses. It is well known that there is a relationship between the emotional valence and arousal dimensions and physiological responses. Facial muscle activation, as measured by electromyography (EMG) relates to the quality of emotional reactions along the negative-positive valence dimension (Larsen, Norris, & Cacioppo, 2003). Especially EMG activity of *corrugator supercilii* muscle (active when frowning) is known to be associated with negative emotions and activity of *zygomaticus major* (active when smiling) with positive emotions. Changes in the skin conductance (SC) levels reflect activation of the sympathetic branch of the autonomic nervous system, which in turn indicates emotional arousal (Bradley, 2009).

Physiological measurements

Facial EMG and SC were measured with a Nexus-32-F physiological monitoring device (Mind Media B.V.) at a sampling rate of 2,048 Hz. Facial EMG activity was measured on the left side of the face at the *corrugator supercilii* and *zygomaticus major* muscle regions with bipolar pre-gelled AgCl sintered electrodes. The guidelines of Fridlund and Cacioppo (1986) were followed for the electrode attachment and placement. The ground electrode was placed over the left mastoid bone. Before applying the electrodes, the skin was cleaned and slightly abraded to decrease the inter-electrode impedance. SC was measured with Ag-AgCl electrodes coated with electrode paste. The electrodes were attached to the medial phalanges of the index and middle fingers of the nondominant hand. Prior to attachment of the electrodes, the participants washed their hands with mild soap and water and dried them carefully.

Data pre-processing

The EMG data were first band-pass filtered with a 20-500Hz band-pass filter to focus the analysis on the frequencies that contain almost exclusively data from the muscles. Next, to obtain an estimate for the amplitude of muscle activity over time, the signal was rectified. The data were then smoothed with a flat “convolve” convolution filter in the numpy python library (with padding to avoid boundary effects at the ends of the signal). A baseline value for the EMG amplitude was found by computing the median amplitude during the break preceding the display of the discussion thread. This baseline EMG was then subtracted from the EMG signals during reading the following discussion thread. After baseline correction, we found the mean values for each of the analyzed segment of the signals. These values were then used in the statistical analysis.

For the SC data, the typical analysis strategy of measuring the amplitude of a skin conductance response (SCR) following a stimulus was not applicable in the current study. The duration of the discussion threads was relatively long and consisted of multiple successive events, thus possibly resulting in several discrete or overlapping SCRs. We used an analysis strategy described by Figner and Murphy (2011), which has been used to analyze SCRs to similar complex and relatively long-lasting stimuli (Helminen, Pasanen, & Hietanen, 2016). In this analysis strategy, the area bounded by a filtered SC curve and the abscissa is calculated, which combines various parameters of SCRs, such as amplitude, frequency and recovery time. The SC data were first band-pass filtered with a 0.05-2Hz band pass filter. The resulting signal was then rectified. The mean of the rectified signal during the time period of interest was taken as an indicator of the area under the curve and used in the statistical analysis.

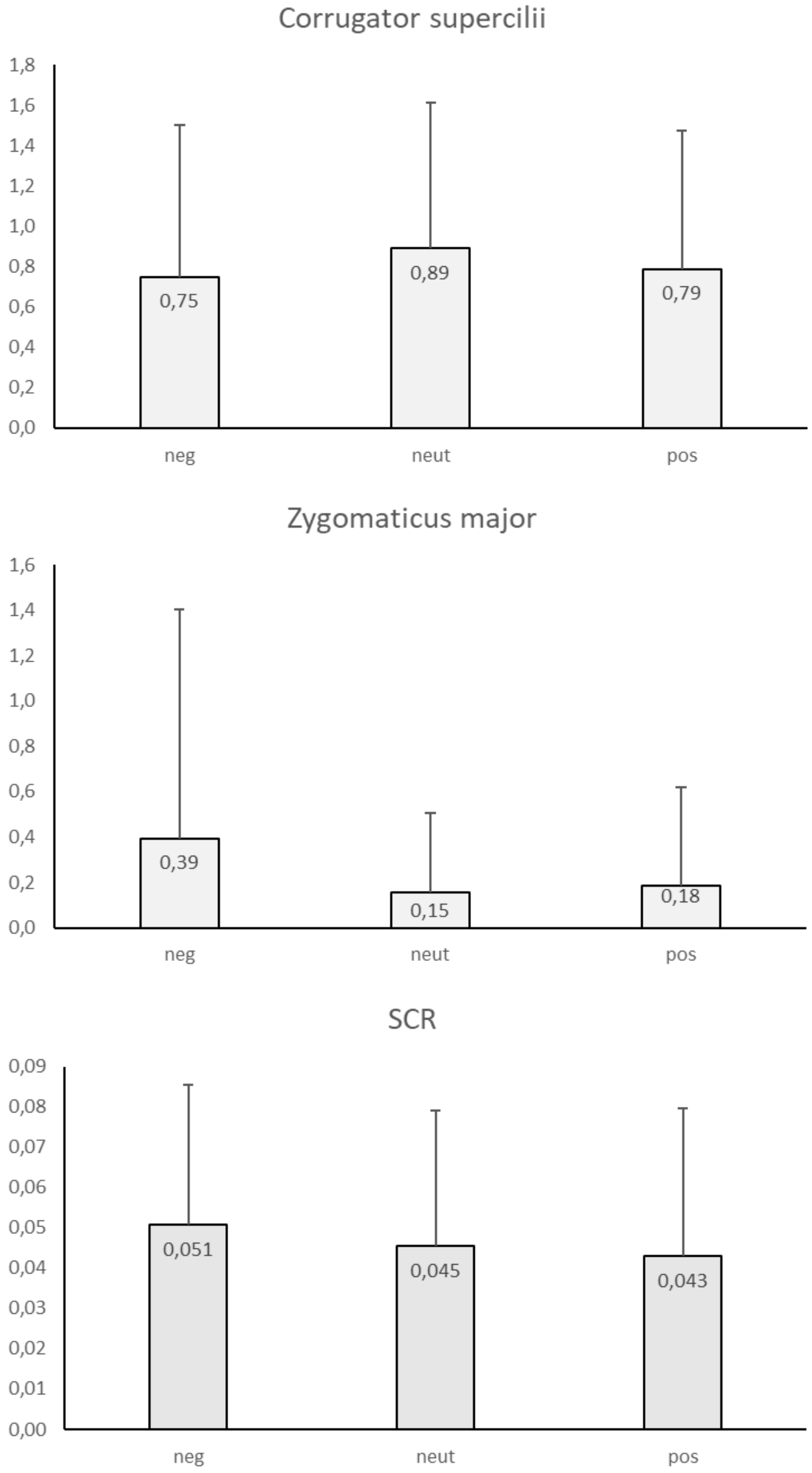
Statistical analysis

The mean EMG and SC responses during reading the negative, neutral, and positive discussion threads were calculated. Outliers over two standard deviations from the group means were removed from the analysis (4.3 % from the *corrugator supercilii* data, 3.5 % from the *zygomaticus major* data, 4.6 % from the SC data). One-way repeated measures ANOVAs were performed to compare the changes in *corrugator supercilii*, *zygomaticus major,* and SC activity between the negative, neutral, and positive discussion threads. The associations between *corrugator supercilii* activity and valence ratings of negative comments, between *zygomaticus major* activity and valence ratings of positive comments, and between the SC and arousal ratings were tested using the Pearson product moment correlation coefficient.

Results

See ESM2 Figure 1 for mean physiological responses in each experimental group. Neither *corrugator supercilii* muscle activity, *zygomaticus major* muscle activity, nor SCRs were statistically significantly different in response to negative, neutral, or positive discussion threads (lowest *p* was for the effect on SCRs; $F(2, 42) = 1.09$, $p = .346$, $\eta_p^2 = .05$). However, there was a statistically significant negative correlation between *corrugator supercilii* activation and valence ratings of negative comments ($r(21) = -0.50$, $p = .020$). The result showed that the more negative the rating of the negative discussion thread, the more *corrugator supercilii* activated. There was no correlation between *zygomaticus major* activation and valence ratings of positive threads ($r(22) = 0.09$, $p = .688$). There was, however, a significant correlation between SCRs and arousal ratings in response to both negative discussion threads ($r(21) = 0.60$, $p = .003$) and positive threads ($r(22) = 0.74$, $p < .001$). Thus, the higher the arousal ratings, the larger the SCRs.

A possible interpretation of these results is that the emotional expressions in the discussion threads were not strong enough to cause different psychophysiological responses between conditions. Statistical power may have also been too low to detect small effects. However, the statistically significant correlations between the ratings and physiological responses suggest that subjectively experienced emotional states while reading emotional discussion threads were associated with corresponding psychophysiological responses in the current experiment.



ESM2 Figure 1. Mean *corrugator supercilii*, *zygomaticus major*, and skin conductance responses in each experimental group in Experiment 2. Error bars denote standard deviations.

Experiment 3

In addition to the valence and arousal measurements, experiment 3 included additional items taken from Garcia, Kappas, Küster, & Schweitzer (2016). Participants rated how interesting each thread was, how relevant each thread was for them, how willing they would be to continue reading the thread, and how willing they would be to participate in the discussion. The items were on a 1 (not at all) to 7 (very much) scale. See ESM2 Table 1 for mean ratings in each condition. These data were analyzed with 2 × 3 mixed-design ANOVAs with Emotional tone (negative / positive) as a between-subjects factor and Affect labeling (Active labeling / Passive labeling / No labeling) as a within-subjects factor. No significant main effects or interactions were found for any of the items (lowest *p* was for the main effect of Affect labeling on willingness to continue reading the thread, $F(2, 184) = 2.78$, $p = .065$, $\eta_p^2 = .03$; other *p*s > .13).

ESM2 Table 1. Means and standard deviations for ratings of interestingness and relevance of each thread, and for willingness to continue reading the thread and participate in it, separately for each condition.

	Interesting			Relevant			Read			Participate		
	AL	PL	NL	AL	PL	NL	AL	PL	NL	AL	PL	NL
Neg	3.46 (1.6)	3.24 (1.5)	3.67 (1.5)	3.09 (1.5)	3.09 (1.5)	2.96 (1.5)	2.78 (1.6)	2.48 (1.5)	3.04 (1.8)	2.13 (1.5)	2.04 (1.3)	2.3 (1.7)
Pos	3.85 (1.6)	3.92 (1.6)	3.81 (1.7)	3.31 (1.6)	3.33 (1.7)	3.44 (1.7)	3.25 (1.8)	3.00 (1.7)	3.25 (1.8)	2.02 (1.2)	1.94 (1.3)	2.0 (1.4)
Note. All measurements were on a 1-7 scale. Neg = negative, Pos = positive, AL = Active labeling, PL = Passive labeling, NL = No labeling												

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