Investigating the effect of emotion on the temporal resolution of visual processing in viewing flickering LED.

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We investigated how emotional responses with different degrees of valence and arousal evoked by viewing a photograph of various facial expressions affects temporal resolution of the visual processing. In Experiment 1, we measured the critical flicker-fusion frequency (CFF) as an index of temporal resolution of visual processing. We used the method of constant stimuli to measure CFF. We presented facial photographs with different expressions (anger, sad, or neutral) in an upright or an inverted orientation. Then, we presented flickering LED with seven different temporal frequencies of LED flicker, and the stimuli in which the duration of on and off of LED was 5ms (100 Hz) as catch stimuli. In each trial, participants reported whether they found the LED flickered or consistent by pressing keys. We found that CFF was smaller for the angry face than for the neutral face only with the upright presentation. In Experiment 2, we measured the detection rate of LED flicker with different ISI (20 or 100ms) between the facial photographs with different expressions (fear, sad, or neutral) and flicker of LED. We prepared four temporal frequency conditions for the LED flashing (15, 17, 19 ms conditions of the on-off of the flashing, and no flickered-consistent condition). Participants reported whether they found the LED flickered or consistent by pressing keys. Results showed that the detection rate for fearful face was significantly higher than the detection rate of the neutral face, and that the detection rate correlated with rating for arousal positively, and with rating for valence negatively only at short ISI. These results suggest that emotion evoked by viewing pictures may elevate the temporal resolution of the visual processing which was measure as CFF only with the upright presentation, and that this effect would decay within short period.

Keywords: critical flicker-fusion frequency, arousal, valence, facial expression, method of constant stimuli