THE TIME COURSE OF BEAUTY. Comparing perceptual and physiological measures of aesthetic experience

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Question

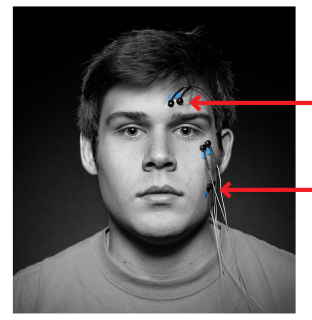
When we experience beauty, do our facial muscles mirror perceived pleasure? We measure the time course of beauty psychophysically and physiologically. We record both during and after, to include growth and decay.

Measurements

We simultaneously record behavior and physiology using:

•Continuous pleasure ratings

•Facial EMG (electromyography)



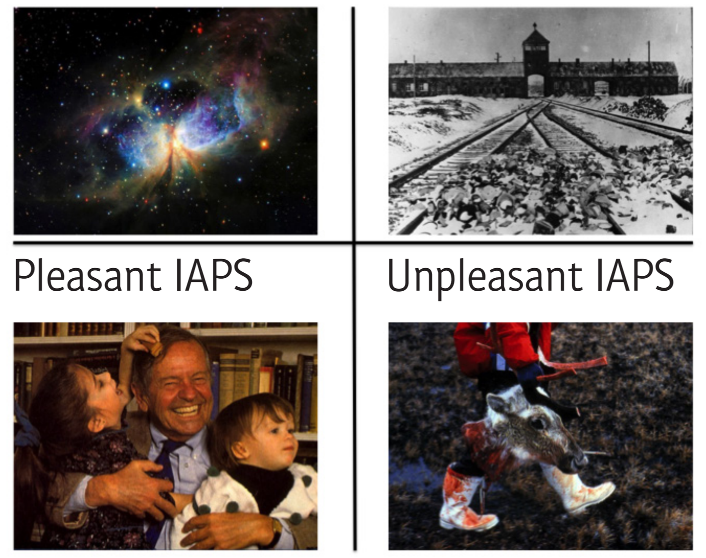
m. Corrugator supercilii (**frown** muscle)

m. Zygomaticus major (**smile** muscle)

Stimuli

•*IAPS* images: 10 Pleasant & 10 Unpleasant images from the IAPS database (Lang, Bradley & Cuthbert, 1997) previously rated high and low on beauty, liking, and pleasantness.

•*Personal* images: 10 "Very pleasant and beautiful to you" (Pleasant) & 10 "Very unpleasant and not at all beautiful to you" (Unpleasant) images selected by participants.



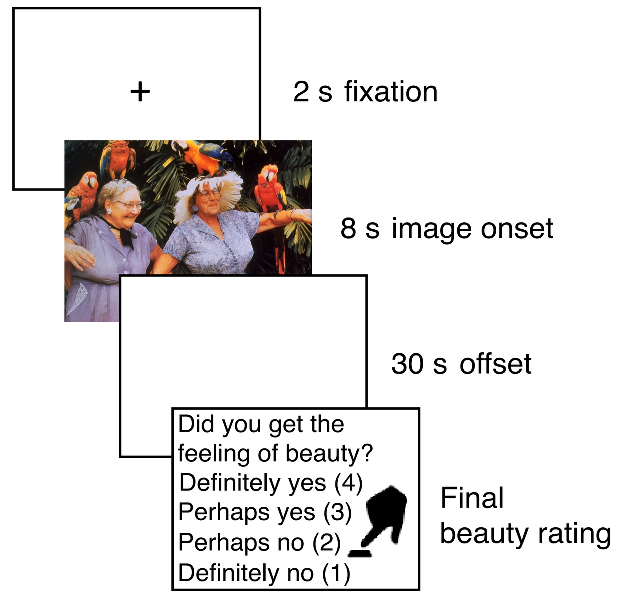
Trial sequence

•Each *trial* includes a 2 s fixation, an 8 s image presentation, and a 30 s blank screen after stimulus offset.

•*Feeling of beauty:* At the end of each trial we ask the participant,

"During this trial, did you get the feeling of beauty from the image?"

They respond on a 4-point scale: **1. Definitely no**, **2. Perhaps no**, **3. Perhaps yes**, **4. Definitely yes**. Each trial's data are color-coded by this response.



Pleasure

Pleasure rating over time

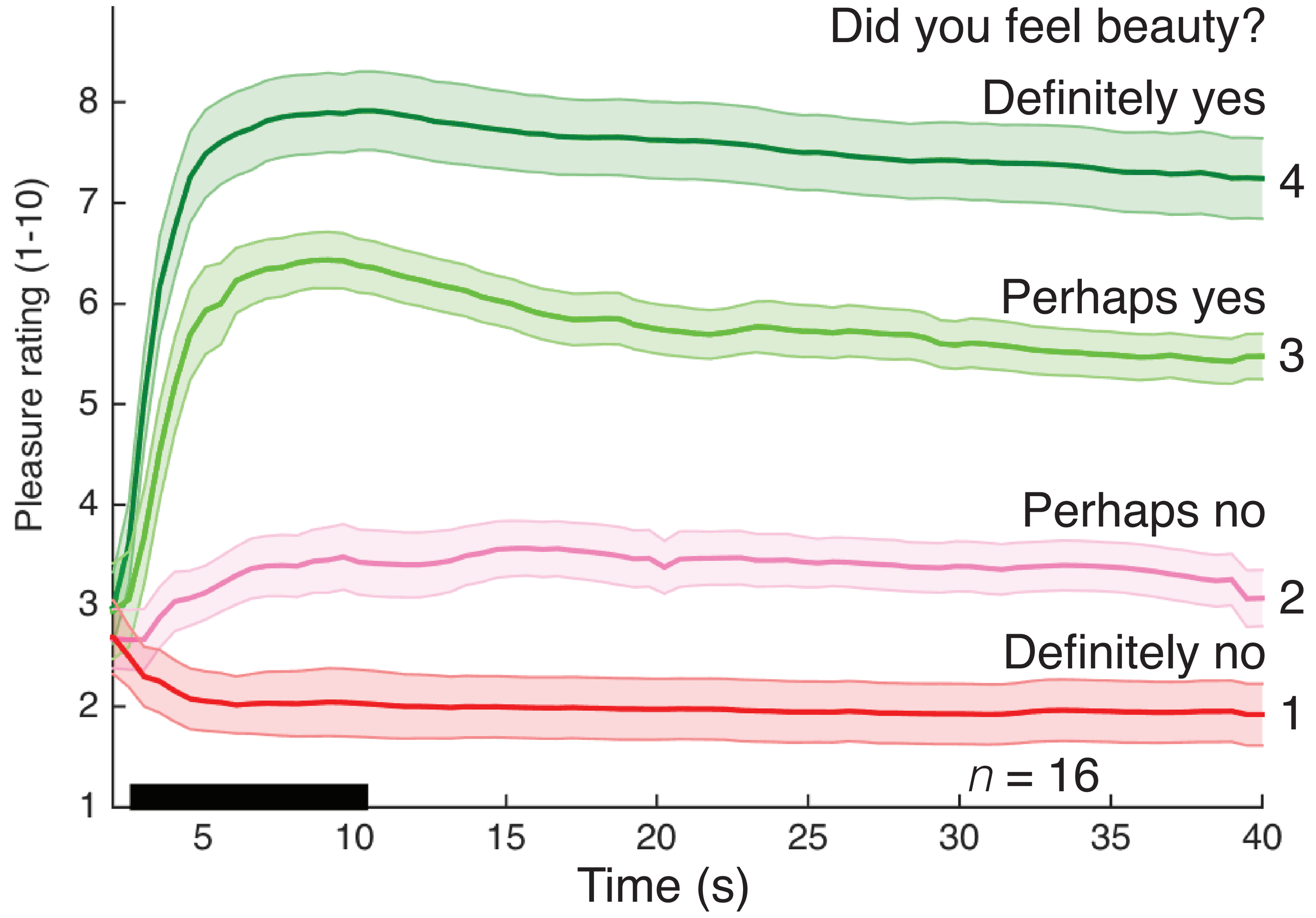


Figure 1a. Average pleasure over time. The shaded area indicates ±1 standard error across participants. The black bar indicates stimulus exposure. Pleasure during and after the stimulus is higher on more beautiful trials.

Smile

Zygomaticus activation over time

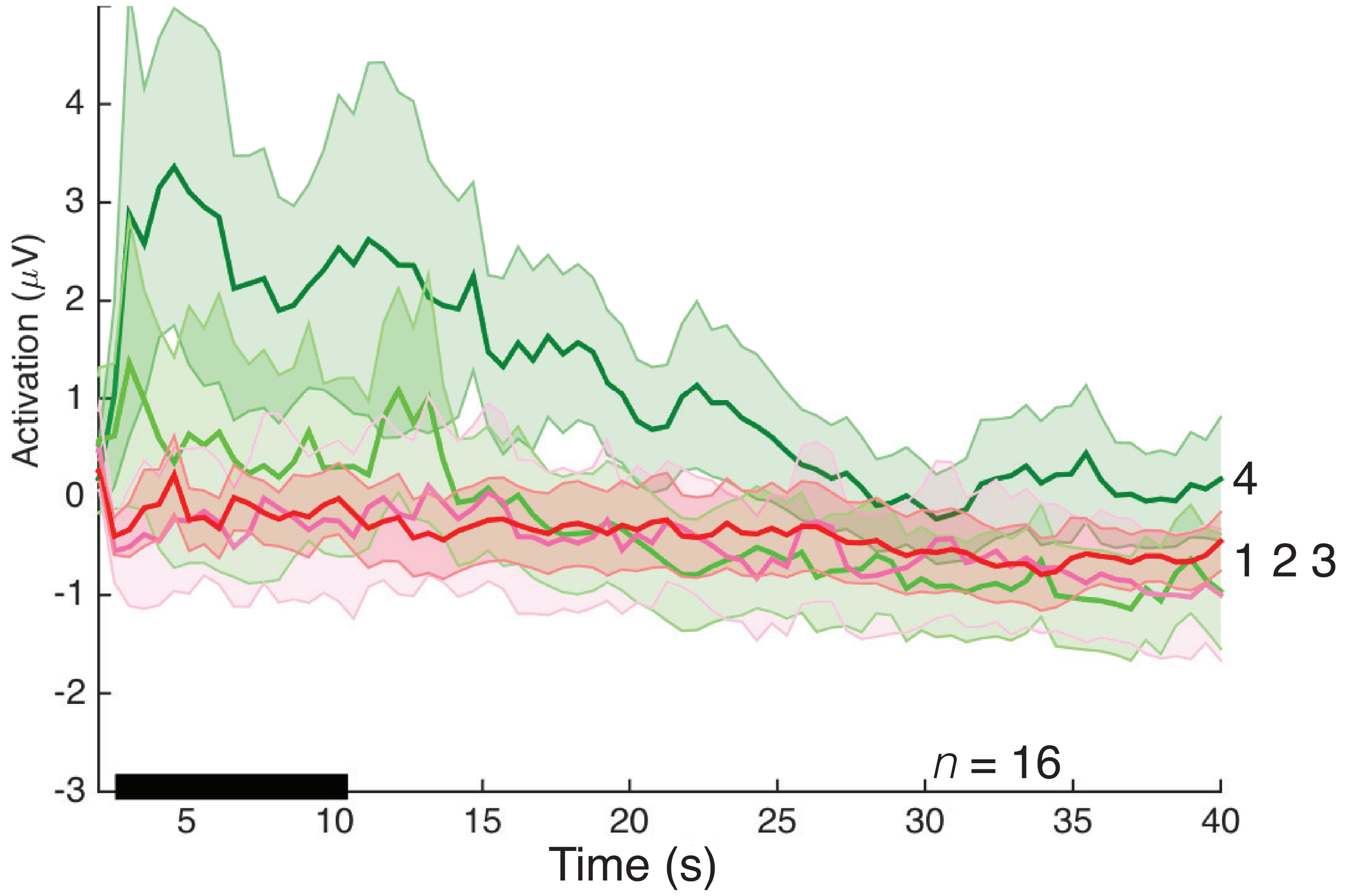


Figure 1b. Average time course of zygomaticus activity. Activation was higher on definitely beautiful trials than all others. The response decays after stimulus offset.

Frown

Corrugator activation over time

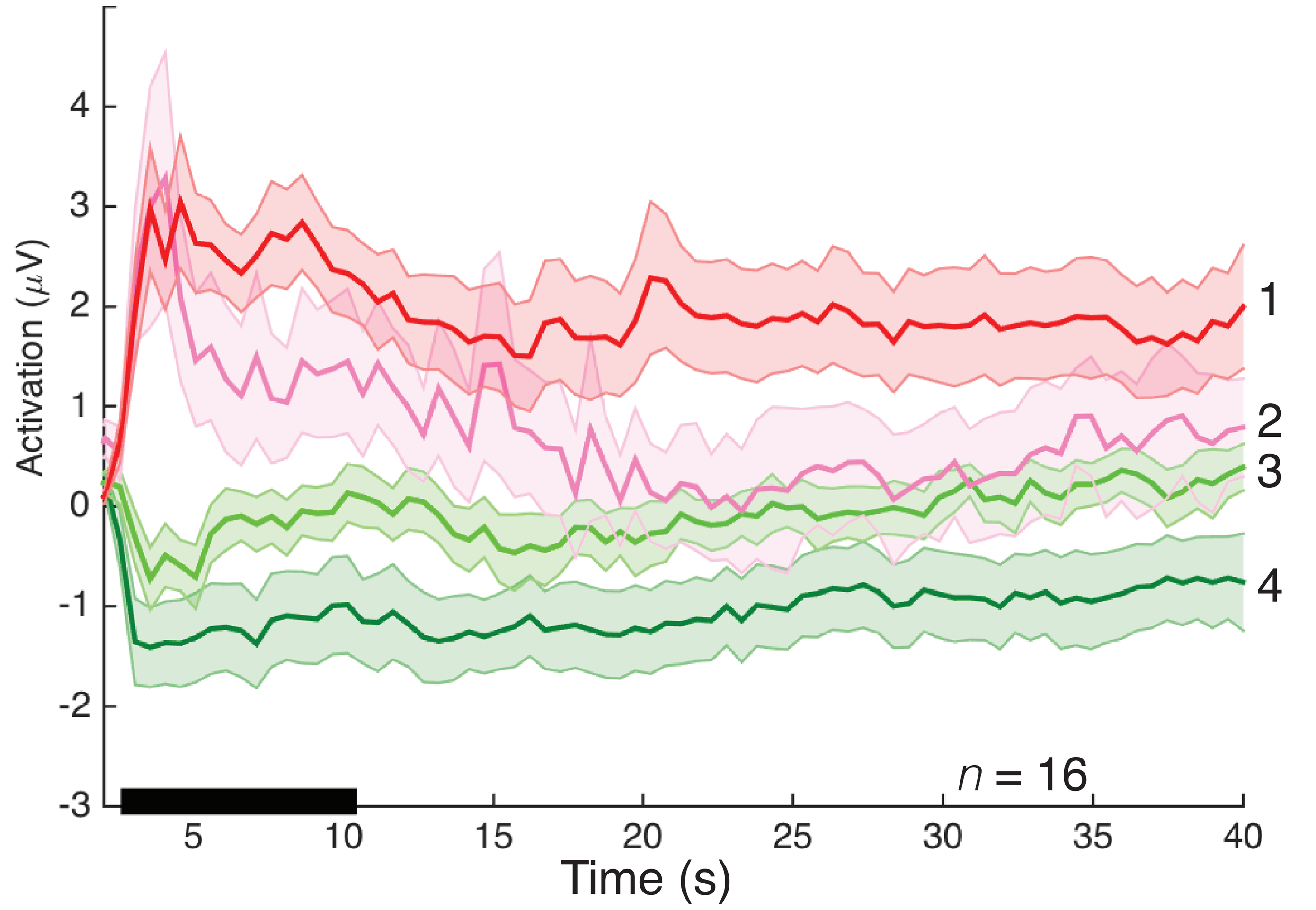


Figure 1c. Average time course of corrugator activity. Activation was highest on definitely not beautiful trials and least on definitely beautiful trials. The response decays after stimulus offset.

Three-number summary

For each measure (pleasure, smile, and frown), we calculate the average amplitude during the stimulus (i) and fit a linear regression to the *decay* (amplitude after stimulus offset), which is reported as the amplitude (ii) and slope (iii) of the regression line at stimulus offset.

Conclusion

During the stimulus, the pleasure of definitely-beautiful trials was four times that of definitely-not-beautiful trials. Smiling was much stronger (+3 μV) and frowning was much weaker (-1 μV) in definitely-beautiful trials than in definitely-not-beautiful trials. After a stimulus disappears in an experience of beauty, the pleasure and frown decay slowly, while the smile decays quickly.

Pleasure

During | At offset | Decay rate

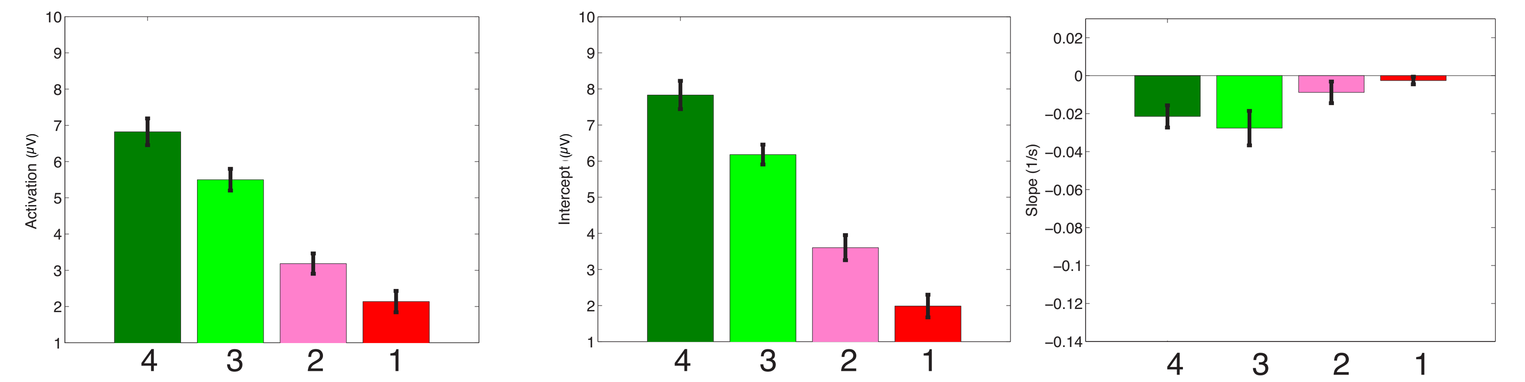


Figure 2a. Average pleasure during the stimulus (i), and, afterwards, the amplitude (ii) and rate (iii) of decay. The higher the final beauty rating (red to green), the greater the average pleasure rating during stimulus and at offset. Pleasure decayed more quickly during beautiful (green) than not-beautiful trials (red). The peak response was 69% correlated with final beauty rating.

Smile

During | At offset | Decay rate

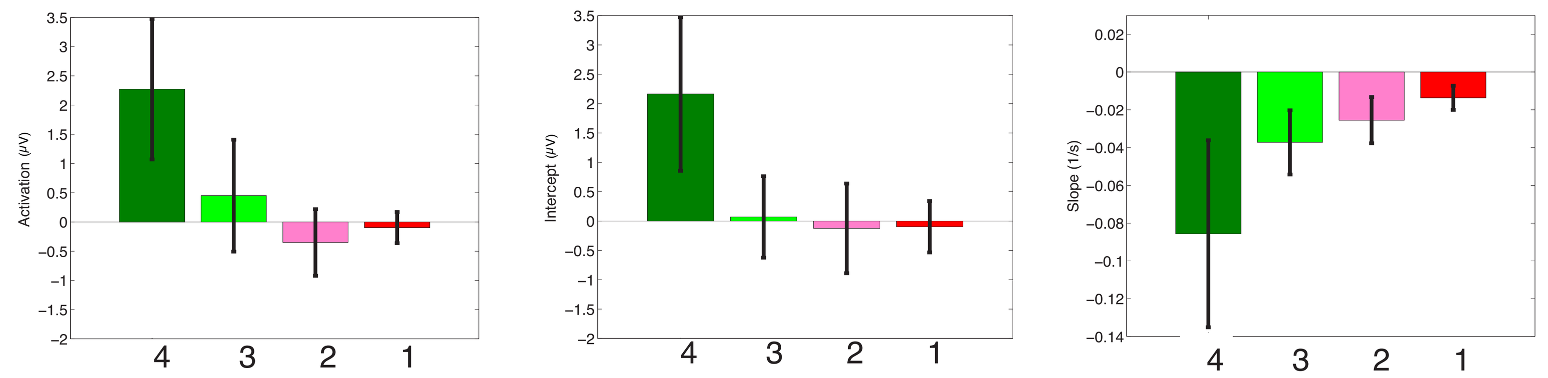


Figure 2b. Average zygomaticus activation during stimulus (i), and the average (ii) and decay rate (iii) at offset. Definitely-beautiful trials (dark green) had the highest pleasure and fastest decay. Peak response was 20% correlated with final beauty rating.

Frown

During | At offset | Decay rate

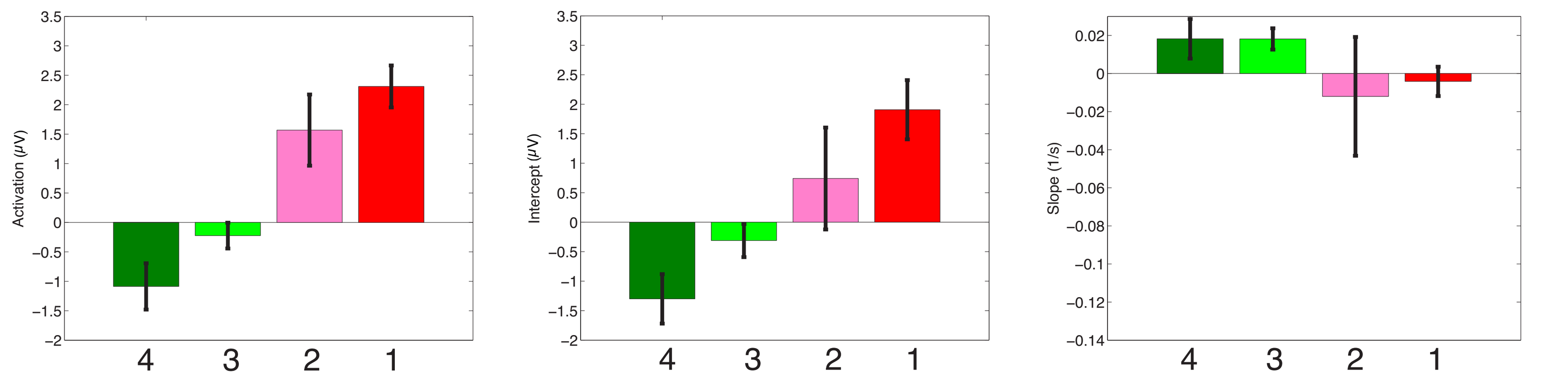


Figure 2c. Average corrugator activation during (i) the stimulus, and the average (ii) and decay rate (iii) at offset. Activation was strongest for definitely-not-beautiful trials (red) and weakest for definitely-beautiful trials (green). The decay rate was similar for definitely and perhaps beautiful trials. Peak response was -29% correlated with final beauty rating.

Citation

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References

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1997). International affective picture system (IAPS): Technical manual and affective ratings. NIMH Center for the Study of Emotion and Attention, 39-58.

Pelli, D.G., & Vale, L. (2014). Lingering pleasure in the experience of beauty. International Association for Empirical Aesthetics, New York, New York, August 22-24, 2014.