# Effect of Surprise emotion on facial landmarks

Paper link - [Distinct temporal features of genuine and deliberate facial expressions of surprise | Scientific Reports (nature.com)](https://www.nature.com/articles/s41598-021-83077-4)

* Theoretical and empirical accounts suggest that the surprise expression is associated with eyebrow (AU1 + 2) and eyelid (AU5) movements, although variations can occur.

Source- Namba, S., Makihara, S., Kabir, R. S., Miyatani, M. & Nakao, T. Spontaneous facial expressions are different from posed facial expressions: Morphological properties and dynamic sequences. *Curr. Psychol.* **36**(3), 593–605 (2017).)

Associated Features-

Angle at left eyebrow top point A(18,20,22)

Angle at left eyebrow top point A(23,25,27)

* The opening of the mouth (AU25) was also included in the stereotypical surprise expressions, but it has not been reliably found to represent surprise.

Source –

1. Reisenzein, R. Exploring the strength of association between the components of emotion syndromes: The case of surprise. *Cogn. Emot.* **14**(1), 1–38 (2000).
2. Reisenzein, R., Bördgen, S., Holtbernd, T. & Matz, D. Evidence for strong dissociation between emotion and facial displays: The case of surprise. *J. Pers. Soc. Psychol.* **91**(2), 295–315 (2006).

Associated Features-

Distance between mouth top point and mouth bottom point L(52,58)

Angle at mouth left point A(51,49,59)

Angle at mouth right point A(55,53,57)

Distance between left eye brow top point and face bottom point L(9,20)

Distance between right eye brow top point and face bottom point L(9,25)

Angle at chin point A(1,9,17)

* Much prior work shows that unexpected events can elicit facial part activations that favor raising the eyebrow and/or eyelid.

Source –

1. Reisenzein, R. Exploring the strength of association between the components of emotion syndromes: The case of surprise. *Cogn. Emot.* **14**(1), 1–38 (2000).
2. Reisenzein, R., Bördgen, S., Holtbernd, T. & Matz, D. Evidence for strong dissociation between emotion and facial displays: The case of surprise. *J. Pers. Soc. Psychol.* **91**(2), 295–315 (2006).
3. Hiatt, S. W., Campos, J. J. & Emde, R. N. Facial patterning and infant emotional expression: Happiness, surprise, and fear. *Child Dev.* **50**(4), 1020–1035 (1979).
4. Schützwohl, A. & Reisenzein, R. Facial expressions in response to a highly surprising event exceeding the field of vision: A test of Darwin’s theory of surprise. *Evol. Hum. Behav.* **33**(6), 657–664 (2012).
5. Durán, J. I., Reisenzein, R., & Fernández-Dols, J. M. Coherence between emotions and facial expressions. *The science of facial expression* 107–129 (2017).

Associated Features-

Angle at left eye's left point A(38,37,42)

Angle at left eye's right point A(39,40,41)

Angle at right eye's right point A(45,46,47)

Angle at right eye's left point A(44,43,48)

Angle at left eye's top point A(37,39,40)

Angle at left eye's top point A(37,38,40)

Angle at right eye's top point A(43,45,46)

Angle at right eye's top point A(43,44,46)

* The activations of the upper face around the eyebrow and eyelid can be considered as main components of the genuine surprise expressions because the subcortical system related to spontaneous responses tends to more strongly affect these upper face muscles.

Source-

1. Bennett, D. S., Bendersky, M. & Lewis, M. Facial expressivity at 4 months: A context by expression analysis. *Infancy* **3**(1), 97–113 (2002).
2. Morecraft, R. J., Louie, J. L., Herrick, J. L. & Stilwell-Morecraft, K. S. Cortical innervation of the facial nucleus in the non-human primate: a new interpretation of the effects of stroke and related subtotal brain trauma on the muscles of facial expression. *Brain* **124**(1), 176–208 (2001).

Associated Features-

Distance between nose-top and left eyebrow rightmost point L(22,28)

Distance between nose-top and right eyebrow leftmost point L(23,28)

Distance between nose-top and left eyebrow leftmost point L(18,28)

Distance between nose-top and right eyebrow rightmost point L(27,28)

Distance between left eyebrow top point and left face top point L(01,20)

Distance between right eyebrow top point and right face top point L(17,25)

Distance between left eyebrow top point and left eye bottom point L(20,42)

Distance between right eyebrow top point and right eye bottom point L(25,47)